Fisher® 3660 and 3661 Positioners

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Figure 1. Fisher 3660 Positioner Mounted on a Baumann Actuator

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Introduction

Scope of Manual

This instruction manual includes installation, operation, calibration, maintenance, and parts ordering information for Fisher 3660 and 3661 positioners. Refer to separate instruction manuals for information on the actuator and control valve.

Do not install, operate, or maintain a 3660 or 3661 positioner without being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance. **To avoid personal injury or property damage it is important to carefully read, understand, and follow all of the contents of this manual, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Description

3660 pneumatic and 3661 electro-pneumatic, single-acting positioners are used with Fisher 657, 667, 1250, 1250R, 3024S, and GX actuators. These positioners can also be mounted on Baumann actuators. Figure 1 shows a 3660 positioner mounted on a Baumann actuator.

The positioner mounts on the actuator and provides the desired plug position for a specific input signal. The 3660 positioner accepts a pneumatic signal and the 3661 accepts a 4 to 20 milliampere DC input signal.

Specifications

Specifications for the 3660 and 3661 positioners are shown in table 1.

Educational Services

For information on available courses for 3660 and 3661 positioners, as well as a variety of other products, contact:

Emerson Process Management
Educational Services, Registration
P.O. Box 190; 301 S. 1st Ave.
Marshalltown, IA 50158-2823
Phone: 800-338-8158 or
Phone: 641-754-3771
FAX: 641-754-3431
e-mail: education@emerson.com

Table 1. Specifications

Available Configuration

3660: Single-acting pneumatic valve positioner
3661: Single-acting electro-pneumatic valve positioner

Input Signal

3660
■ 0.2 to 1.0 bar (3 to 15 psig),
■ 0.4 to 2.0 bar (6 to 30 psig), or
■ split range (see tables 7 and 8)
3661:
■ 4 to 20 mA DC constant current with 30 VDC maximum compliance voltage.
■ split range is also available, see tables 7 and 8

Equivalent Circuit (3661)

120 ohms shunted by three 5.6 V zener diodes

Output Signal

Type: Pneumatic pressure as required by the actuator up to full supply pressure
Action:
■ Direct (increasing input signal pressure increases positioner output),
■ Reverse (increasing input signal pressure decreases positioner output)

Supply Pressure(1)

Recommended: 10% above actuator requirements
Maximum: 6.2 bar (90 psig) or pressure rating of actuator, whichever is lower

Medium: air

3660 and 3661 are not compatible with natural gas as the supply medium

Performance

Independent Linearity: ±1% of output span
Hysteresis: 0.5% of output span(2)
Deadband: 0.1% of input span
Electromagnetic Compatibility for 3661 electro-pneumatic positioner:
Meets EN 61326-1 (First Edition)
Immunity—Industrial locations per Table 2 of the EN 61326-1 standard. Performance is shown in table 2 below.
Emissions—Class A
ISM equipment rating: Group 1, Class A

Positioner Adjustments

Span: ■ Adjustable up to 20 mm (0.75 inch) stem travel, or ■ Adjustable from 20 mm (0.75 inch) to 50 mm (2 inch) stem travel
Zero: 0 to 100%
Gain: 0.5 to 6% PB (proportional band)(3)
Output Volume Damping: Loop dynamic response adjustment

Delivery Capacity(4)

1.4 Bar (20 Psig) Supply: 4.3 normal m^3/hour (150 scfh)
2.4 Bar (35 Psig) Supply: 6.6 normal m^3/hour (230 scfh)

Exhaust Capacity(4)

1.4 Bar (20 Psig) Supply: 4.8 normal m^3/hour (170 scfh)
2.4 Bar (35 Psig) Supply: 7.4 normal m^3/hour (260 scfh)

Steady-State Air Consumption(4,5)

3660: 0.17 normal m^3/hour (6.0 scfh) at 1.4 bar (20 psig) supply pressure. 0.22 normal m^3/hour (7.9 scfh) at 2.4 bar (35 psig) supply pressure
3661: 0.24 normal m^3/hour (8.8 scfh) at 1.4 bar (20 psig) supply pressure. 0.33 normal m^3/hour (12.3 scfh) at 2.4 bar (35 psig) supply pressure

Operating Influence

Supply Pressure: 70 mbar (1 psig) change in supply pressure changes the actuator stem position less than 0.16%(6) of travel

Operative Temperature Limits(1)

3660 without Pressure Gauges: -40 to 121°C (-40 to 250°F)
3660 with Pressure Gauges: -40 to 82°C (-40 to 180°F)
3661 with or without Pressure Gauges: -40 to 82°C (-40 to 180°F)

Hazardous Area Classification for 3660

3660 pneumatic positioners comply with the requirements of ATEX Group II Category 2 Gas and Dust

CE ⟨Ex⟩ II 2 G D

- continued -

Table 1. Specifications (Continued)

Hazardous Area Classification for 3661

CSA—Intrinsically Safe, Type n, Non-incendive

FM—Intrinsically Safe, Type n, Non-incendive

ATEX—Intrinsically Safe, Type n
(Gas Atmospheres Only)

IECEx—Intrinsically Safe, Type n
(Gas Atmospheres Only)

Refer to Hazardous Area Classifications and Special Instructions for "Safe Use" and Installation in Hazardous Locations, starting on page 5, for additional information.

Housing Classification for 3661

CSA—Type 3 Encl.

FM—NEMA 3, IP54

ATEX—IP44

IECEx—IP44

Mounting orientation requires vent location to be below horizontal.

Other Classifications/Certifications for 3661

KGS—Korea Gas Safety Corporation

Mounting

The positioner can be mounted in one of four different configurations. See figure 2 for mounting.

Pressure Connections

1/4 NPT internal

Conduit Connection for 3661

1/2 NPT (M20 or PG13 adaptors, optional)

Maximum Valve Stem Travel

Two ranges:
■ 50 mm (2 inch) to 20 mm (0.75 inch) minimum;
■ 20 mm (0.75 inch) adjustable to lesser travel with standard input signal

Approximate Weight

3660: 1.2 kg (2.6 pounds)
3661: 1.4 kg (3.0 pounds)

Vent Connection

1/4 NPT internal

Options

3660: ■ Instrument and output pressure gauges, ■ Integrally mounted bypass valve
3661: Output pressure gauge

Declaration of SEP

Fisher Controls International LLC declares this product to be in compliance with Article 3 paragraph 3 of the Pressure Equipment Directive (PED) 97 / 23 / EC. It was designed and manufactured in accordance with Sound Engineering Practice (SEP) and cannot bear the CE marking related to PED compliance.

However, the product *may* bear the CE marking to indicate compliance with *other* applicable European Community Directives.

NOTE: Specialized instrument terms are defined in ANSI/ISA Standard 51.1 - Process Instrument Terminology.
1. The pressure/temperature limits in this manual and any applicable standard or code limitation should not be exceeded.
2. Hysteresis value at a gain setting of 1/2 turn.
3. Adjusting the gain (PB) adjustment changes the nozzle flapper relationship. This nozzle flapper change affects the actuator/positioner response time.
4. Normal m^3/hr—normal cubic meters per hour (0°C and 1.01325 bar absolute); Scfh—standard cubic feet per hour (60°F and 14.7 psia).
5. Air consumption at a gain setting of 1/2 turn.
6. At supply pressure of 2.4 bar (35 psig).

Table 2. Fisher 3661 Positioner EMC Summary Results—Immunity

Port	Phenomenon	Basic Standard	Test Level	Performance Criteria(1)
Enclosure	Electrostatic discharge (ESD)	IEC 61000-4-2	4 kV contact 8 kV air	A
	Radiated EM field	IEC 61000-4-3	80 to 1000 MHz @ 10V/m with 1 kHz AM at 80% 1400 to 2000 MHz @ 3V/m with 1 kHz AM at 80% 2000 to 2700 MHz @ 1V/m with 1 kHz AM at 80%	A
	Rated power frequency magnetic field	IEC 61000-4-8	60 A/m at 50 Hz	A
I/O signal/control	Burst	IEC 61000-4-4	1 kV	A
	Surge	IEC 61000-4-5	1 kV (line to ground only, each)	B
	Conducted RF	IEC 61000-4-6	150 kHz to 80 MHz at 3 Vrms	A

Specification limit = ±1% of span
1. A = No degradation during testing. B = Temporary degradation during testing, but is self-recovering.

Installation

Typically, a positioner is shipped with the actuator. If so, the factory mounts and calibrates the positioner and connects the positioner to actuator tubing. If the positioner is ordered separately from the actuator, perform the appropriate mounting procedure. Refer to the appropriate instruction manuals for actuator and valve installation procedures.

⚠ WARNING

Always wear protective clothing, gloves, and eyewear when performing any Installation procedures to avoid personal injury.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Hazardous Area Classifications and Special Instructions for "Safe Use" and Installation in Hazardous Locations for 3661 Positioner

Certain nameplates may carry more than one approval, and each approval may have unique installation/wiring requirements and/or conditions of "safe use". These special instructions for "safe use" are in addition to, and may override, the standard installation procedures. Special instructions are listed by approval.

Note

This information supplements the nameplate markings affixed to the product.

Always refer to the nameplate itself to identify the appropriate certification.

⚠ WARNING

Failure to follow these conditions of "safe use" could result in personal injury or property damage from fire or explosion, and area re-classification.

CSA

Special Conditions of Safe Use

Intrinsically Safe and Non-incendive

No special conditions for safe use.

Type n

Type n installations must be in a suitable (IP5X) enclosure.

Refer to table 3 for additional approval information, figure 27 for CSA loop schematics, and figure 28 for a typical CSA/FM approval nameplate.

Table 3. Hazardous Area Classifications for Fisher 3661 Positioner—CSA (Canada)

Certification Body	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
CSA	Intrinsically Safe Ex ia IIC T4/T5/T6 per drawing GE28591 Class I, II Division 1 GP A,B,C,D,E,F,G T4/T5/T6 per drawing GE28591	Vmax = 30 VDC Imax = 150 mA Pi = 1.25 W Ci = 0 nF Li = 0 mH	T4 (Tamb ≤ 82°C) T5 (Tamb ≤ 62°C) T6 (Tamb ≤ 47°C)	CSA Type 3 Encl.
	Type n Ex nA IIC T6	---	T6 (Tamb ≤ 82°C)	CSA Type 3 Encl.
	Class I Division 2 GP A,B,C,D T6	---	T6 (Tamb ≤ 82°C)	CSA Type 3 Encl.

FM

Intrinsically Safe, Type n, and Non-incendive

No special conditions for safe use.

Refer to table 4 for approval information, figure 29 for the FM loop schematic, and figure 28 for a typical CSA/FM approval nameplate.

Table 4. Hazardous Area Classifications for Fisher 3661 Positioner—FM (United States)

Certification Body	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
FM	Intrinsically Safe Class I Zone 0 AEx ia IIC T4/T5/T6 per drawing GE28590 Class I, II, III Division 1 GP A,B,C,D,E,F,G T4/T5/T6 per drawing GE28590	Vmax = 30 VDC Imax = 150 mA Pi = 1.25 W Ci = 0 nF Li = 0 mH	T4 (Tamb ≤ 82°C) T5 (Tamb ≤ 62°C) T6 (Tamb ≤ 47°C)	NEMA 3, IP54
	Type n Class I Zone 2 AEx nA IIC T5	---	T5 (Tamb ≤ 82°C)	NEMA 3, IP54
	Class I Division 2, GP A,B,C,D T5 Class II, III Division 2, GP F,G T5	---	T5 (Tamb ≤ 82°C)	NEMA 3, IP54

ATEX

Special Conditions for Safe Use

Intrinsically Safe

This equipment is intrinsically safe and can be used in potentially explosive atmospheres.

The electrical parameters of certified equipment which can be connected to the device must not exceed the following value: $U_0 \leq 30$ Vdc; $I_0 \leq 150$ mA; $P_0 \leq 1.25$ W.

Ambient Temperature:
T6, at Tamb = 47°C
T5, at Tamb = 62°C
T4, at Tamb = 71°C

Type n

The 3661 has an IP44 ingress protection: it is only intended to be installed in an area where a convenient protection is ensured against the entry of solid foreign bodies and liquids which may decrease the safety.

Refer to table 5 for additional approval information and figure 30 for a typical ATEX/IECEx approval nameplate.

Table 5. Hazardous Area Classifications for Fisher 3661 Positioner—ATEX

Certificate	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
ATEX	Ⓔx II 1 G Intrinsically Safe Gas Ex ia IIC T4/T5/T6	Ui = 30 VDC Ii = 150 mA Pi = 1.25 W Ci = 0 nF Li = 0 mH	T4 (Tamb ≤ 82°C) T5 (Tamb ≤ 62°C) T6 (Tamb ≤ 47°C)	IP44
	Ⓔx II 3 G Type n Gas Ex nA IIC T6	---	T6 (Tamb ≤ 82°C)	IP44

IECEx

Conditions of Certification

Intrinsically Safe

⚠ WARNING

Substitution of components may impair intrinsic safety.

-40°C Ta +82°C; T6 (Ta +47°C); T5 (Ta +62°C)

Entity Parameters
Ui = 30 V, Ii = 150 mA, Pi = 1.25 W, Ci = 0 nF, Li = 0 mH

Type n

⚠ WARNING

Disconnect power before opening.

-40°C Ta +82°C; T6 (Ta +82°C)

Refer to table 6 for additional approval information, and figure 30 for a typical ATEX/IECEx approval nameplate.

Table 6. Hazardous Area Classifications for Fisher 3661 Positioner—IECEx

Certificate	Certification Obtained	Entity Rating	Temperature Code	Enclosure Rating
IECEx	Intrinsically Safe Gas Ex ia IIC T4/T5/T6	Ui = 30 VDC Ii = 150 mA Pi = 1.25 W Ci = 0 nF Li = 0 mH	T4 (Tamb ≤ 82°C) T5 (Tamb ≤ 62°C) T6 (Tamb ≤ 47°C)	IP44
	Type n Gas Ex nA IIC T6	---	T6 (Tamb ≤ 82°C)	IP44

Positioner Mounting

Mounting on 1250, 1250R, 3024S, and GX Actuators

During the following mounting procedures, refer to figures 3, 24, and 25 for key number locations.

Figure 3 shows keys 64 through 78 and 101 through 104. Other key numbers are shown in either figure 24 for the 3660 positioner or figure 25 for the 3661 positioner. Two mounting methods are available, center-bolt mounting and clamp mounting.

1. Determine the positioner mounting configuration from figure 2. The actuator size, actuator travel, and positioner action must be known. If center-bolt mounting is desired, be certain the actuator is equipped with tapped holes in the posts.
2. Thread the hex head screws with washers (keys 69 and 70) several turns into the stem connector. The feedback plate (key 68) is reversible and must be positioned so that the pilot shaft (key 19A) will operate correctly in the slot of the feedback plate. For actuator travels between 20 and 30 mm (0.787 and 1.18 inches) (for 3024S actuators, travel ranges between 16 and 32 mm), position the feedback plate so the long portion of its slot, when bolted to the stem connector, is closest to the positioner as shown in figure 4. For travels greater than 30 mm (1.18 inches), reverse the position of the feedback plate as shown in figure 4.

   a. For size 30 and 34 actuators with all travels and for size 45 actuators with travel greater than 30 mm (1.18 inches), position the feedback plate (key 68) between the stem connector and washers and tighten the hex head screws (key 69).

   b. For size 45 actuators with travel between 20 and 30 mm (0.787 and 1.18 inches) (16 and 32 mm for 3024S actuators), attach the feedback adaptor (key 103) to the feedback plate (key 68) using machine screws, lockwashers, and wedge nuts (keys 102, 101, and 104). The feedback plate and the wedge nuts must be assembled as shown in the lower right portion of figure 3. Use the mounting holes in the feedback adaptor and position it as indicated in figure 4. Then, position the feedback plate between the stem connector and washers and tighten the hex head screws (key 69).

3. Unscrew the two machine screws (key 24), and remove the positioner cover (key 21).

Center-Bolt Mounting (GX Actuator)

   a. As shown in figure 5, a thin knockout section is cast across the mounting hole in the housing. Check to make certain this knockout section has been removed. If the knockout section has not been removed, use a punch to knock it out.

   b. Attach the positioner to the actuator using a sealing washer and hex head screw (keys 71 and 72).

   c. Install the feedback lever assembly and range spring.

Clamp Mounting

   a. Install a hex nut (key 66) on one end of each of two studs (key 65). Turn the nuts all the way to the end of the threads.

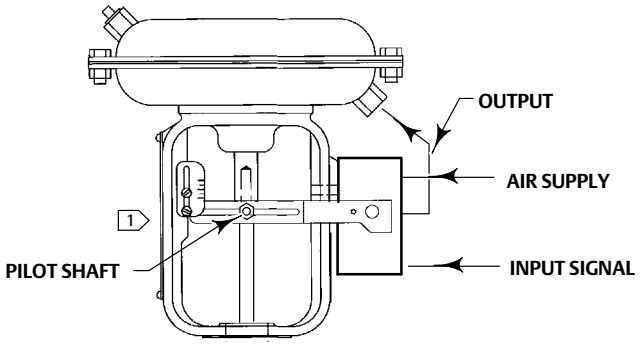
   b. Thread the end of each stud (key 65), (the end with hex nut—key 66), into the back of the positioner housing (key 1) as far as the studs will go. Tighten both nuts against the housing.

   c. Set the actuator at mid-travel using a manual loading regulator.

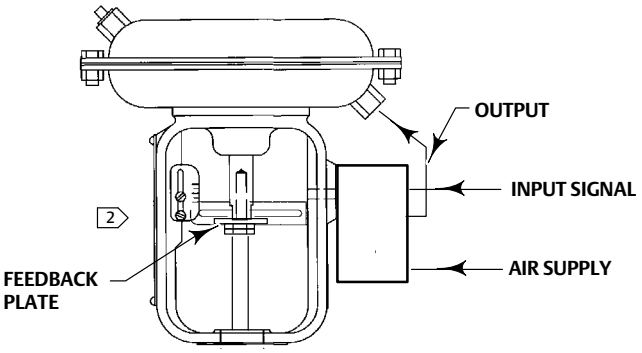
   d. With the finger end of the bracket (key 64) toward the positioner pressure connections as shown in figure 3, place the bracket and washers (key 67) over the studs (key 65). Thread the hex nuts (key 66) several turns onto the studs.

Figure 2. Mounting Configurations

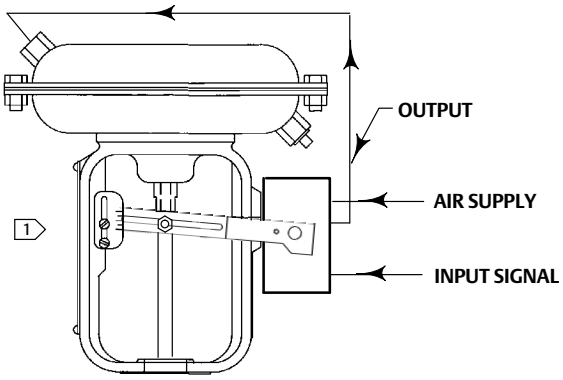
Input Signal	Positioner Output
Direct 0.2 to 1.0 bar (3 to 15 psig) 0.4 to 2.0 bar (6 to 30 psig) 4 to 20 mA	Up to 6.2 bar (90 psig)
Reverse 1.0 to 0.2 bar (15 to 3 psig) 2.0 to 0.4 bar (30 to 6 psig) 20 to 4 mA	
For split range signal refer to tables 7 and 8	



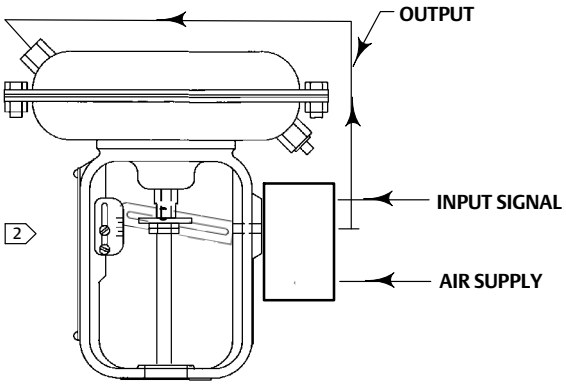
ACTUATOR: AIR-TO-RETRACT
POSITIONER ACTION: DIRECT
(INCREASING INPUT SIGNAL INCREASES OUTPUT PRESSURE TO ACTUATOR)



ACTUATOR: AIR-TO-RETRACT
POSITIONER ACTION: REVERSE
(INCREASING INPUT SIGNAL DECREASES OUTPUT PRESSURE TO ACTUATOR)



ACTUATOR: AIR-TO-EXTEND
POSITIONER ACTION: REVERSE
(INCREASING INPUT SIGNAL DECREASES OUTPUT PRESSURE TO ACTUATOR)



ACTUATOR: AIR-TO-EXTEND
POSITIONER ACTION: DIRECT
(INCREASING INPUT SIGNAL INCREASES OUTPUT PRESSURE TO ACTUATOR)

NOTES:
1 WHEN MOUNTING ON BAUMANN ACTUATORS, INSTALL FEEDBACK PLATE SO LIP IS UP. INSTALL FEEDBACK LEVER ARM ASSEMBLY, PRELOADED, SO PILOT SHAFT IS ON TOP OF THE FEEDBACK PLATE.
2 WHEN MOUNTING ON BAUMANN ACTUATORS, INSTALL FEEDBACK PLATE SO LIP IS DOWN. INSTALL FEEDBACK LEVER ARM ASSEMBLY, PRELOADED, SO PILOT SHAFT IS UNDERNEATH THE FEEDBACK PLATE.

17B9106-B
17B9105-B
38B0195-B
A4035-2

Figure 3. Positioner Mounting on Fisher 1250, 1250R, and 3024S Actuators

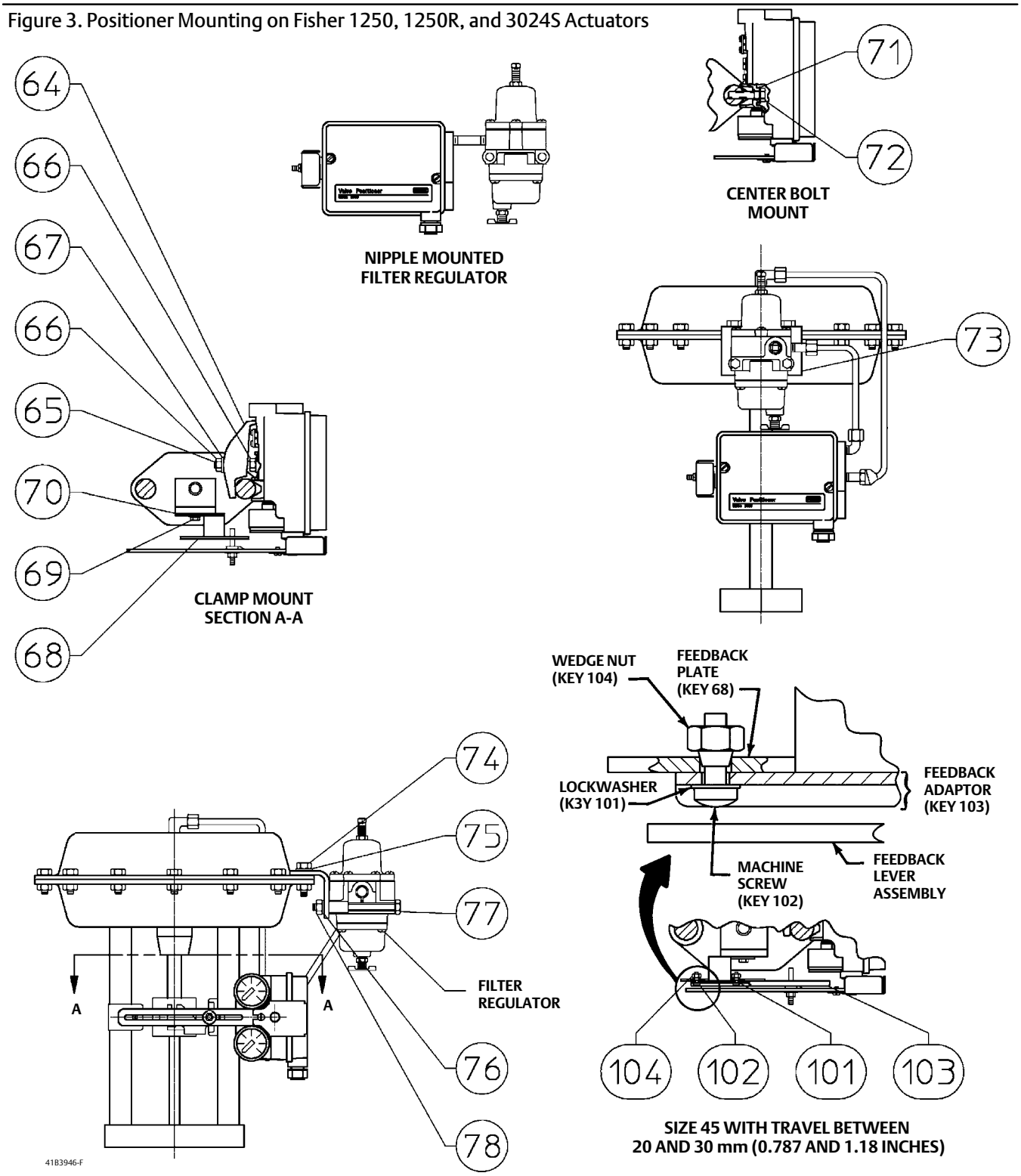
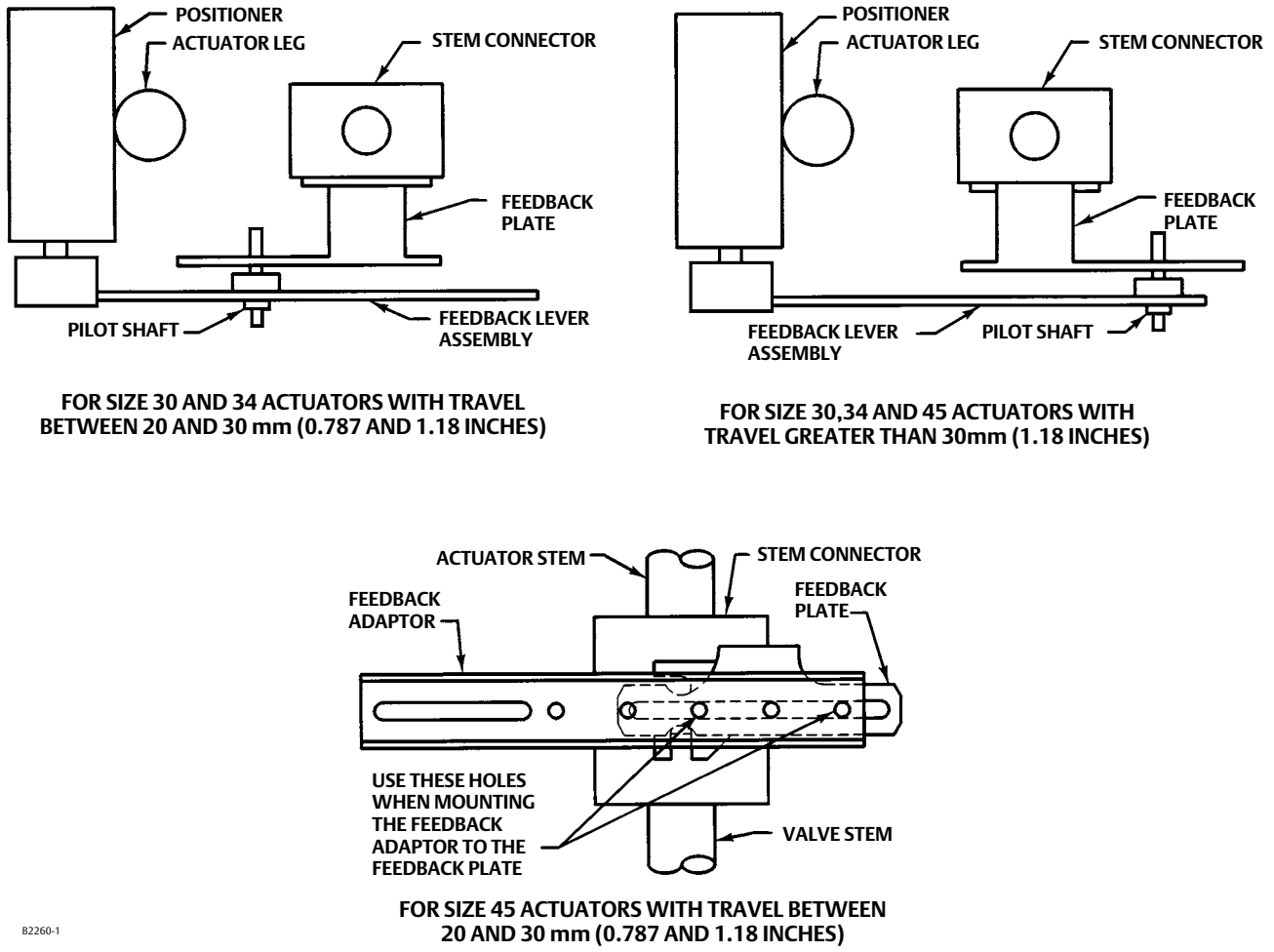


Figure 4. Feedback Plate Orientation with Positioner Mounted on Fisher 1250, 1250R, and 3024S Actuators


POSITIONER
ACTUATOR LEG
STEM CONNECTOR
FEEDBACK PLATE
PILOT SHAFT
FEEDBACK LEVER ASSEMBLY
FOR SIZE 30 AND 34 ACTUATORS WITH TRAVEL BETWEEN 20 AND 30 mm (0.787 AND 1.18 INCHES)
POSITIONER
ACTUATOR LEG
STEM CONNECTOR
FEEDBACK PLATE
FEEDBACK LEVER ASSEMBLY
PILOT SHAFT
FOR SIZE 30,34 AND 45 ACTUATORS WITH TRAVEL GREATER THAN 30mm (1.18 INCHES)
ACTUATOR STEM
STEM CONNECTOR
FEEDBACK ADAPTOR
FEEDBACK PLATE
USE THESE HOLES WHEN MOUNTING THE FEEDBACK ADAPTOR TO THE FEEDBACK PLATE
VALVE STEM
FOR SIZE 45 ACTUATORS WITH TRAVEL BETWEEN 20 AND 30 mm (0.787 AND 1.18 INCHES)
B2260-1

Note

Do not install the range spring in the following step. Feedback lever assembly (key 19) installation in the next step is only temporary to permit verifying alignment.

e. Install the positioner on the actuator by placing the bracket (key 64) around the appropriate actuator leg. Visually center the center line of the slot in the feedback plate (key 68) with the center line of the hole in the housing. Then, tighten the nuts (key 66) only tight enough to prevent the positioner from moving on the actuator leg. Locate the feedback lever assembly (key 19) so that it may be temporarily installed into the positioner housing (key 1) and the feedback plate (key 68) to verify alignment. Do not install the range spring at this time. Place the pilot shaft (key 19A) in the slot of the feedback plate, and, at the same time, insert the feedback shaft in the hole of the positioner housing. Depress the feedback lever assembly inward until it stops against the housing. Make certain the slots in both the feedback lever assembly and the feedback plate are horizontal with each other and that the feedback lever assembly and the feedback plate are parallel with each

other. If necessary, correct alignment by loosening the hex nuts (key 66) and moving the positioner on the actuator leg as required.

f. Tighten the two hex nuts (key 66) to secure the positioner to the actuator leg.

g. Install the feedback lever assembly and range spring.

Mounting on Baumann Actuators

During the following mounting procedures, refer to figures 2, 5, 6, 24, and 25. Key numbers are shown in either figure 24 for the 3660 positioner or figure 25 for the 3661 positioner.

Figure 5. Actuator Center-Bolt Mounting

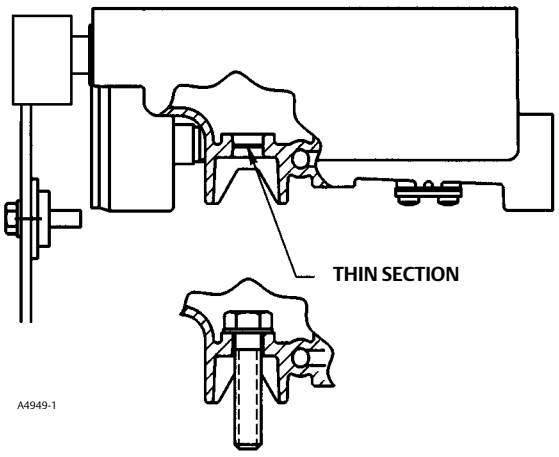
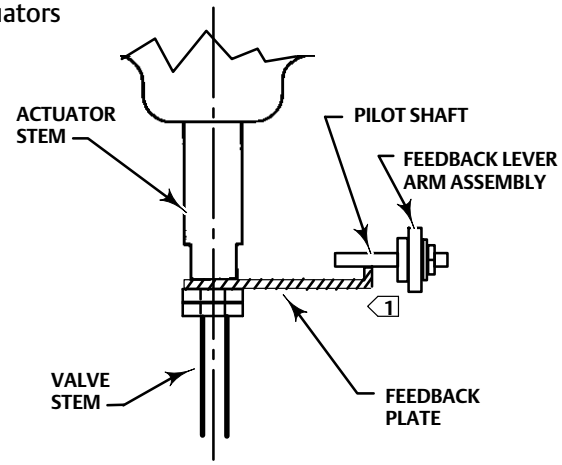


Figure 6. Feedback Plate Installation for Baumann Actuators



1 IF AFTER MOUNTING POSITIONER, THE FEEDBACK LEVER ARM ASSEMBLY WILL BE ON THE LEFT SIDE OF THE POSITIONER, INSTALL THE FEEDBACK PLATE SO THE LIP IS UP. INSTALL THE FEEDBACK LEVER ARM ASSEMBLY, PRELOADED, SO THE PILOT SHAFT IS ABOVE THE PLATE. IF AFTER MOUNTING POSITIONER, THE FEEDBACK LEVER ARM ASSEMBLY WILL BE ON THE RIGHT SIDE OF THE POSITIONER, INSTALL THE FEEDBACK PLATE SO THE LIP IS DOWN. INSTALL THE FEEDBACK LEVER ARM ASSEMBLY, PRELOADED, SO THE PILOT SHAFT IS BELOW THE PLATE.

A7223

1. Determine the positioner mounting configuration from figure 2. The actuator size, actuator travel, and positioner action must be known.
2. Attach the feedback plate to the actuator stem connector by locating the feedback plate between the actuator stem and valve stem nuts (figure 6) as follows:
   - If after the positioner is mounted the feedback lever assembly will be on the left side of the positioner, install the feedback plate so the lip is up.
   - If after the positioner is mounted the feedback lever assembly will be on the right side of the positioner, install the feedback plate so the lip is down.
3. Unscrew the two machine screws (key 24), and remove the positioner cover (key 21).
4. As shown in figure 5, a thin knockout section is cast across the mounting hole in the housing. Check to make certain this knockout section has been removed. If the knockout section has not been removed, use a punch to knock it out.
5. For air to extend actuators, the feedback lever assembly must be installed into the positioner and preloaded before attaching the positioner to the actuator.
6. Attach the positioner to the actuator using a sealing washer and hex head screw (keys 71 and 72).
7. Install the feedback lever assembly and range spring.

Mounting on 657 and 667 Actuators

During the following mounting procedures, refer to figures 7, 24, and 25 for key number locations. Figure 7 shows keys 69 and 70, 73 through 78, and 82 through 93. Other key numbers are shown in either figure 24 for the 3660 positioner or figure 25 for the 3661 positioner.

1. Determine the positioner mounting configuration from figure 2. The actuator size, actuator travel, and positioner action must be known.

Note

The actuator bench set spring load must be released before removing the stem connector cap screws. Refer to the appropriate actuator instruction manual for this procedure. After installing the positioner and mounting hardware, reset the actuator bench set.

2. Attach the connector bracket (key 87) to the actuator stem connector using washers and cap screws (keys 70 and 69), but do not tighten the screws. Refer to figures 7 and 8 for the proper orientation of the connector bracket with respect to the actuator stem connector. The face of the stem connector should be perpendicular to the legs of the actuator yoke.
3. Refer to figure 8 for the feedback arm (key 88) location with respect to the connector bracket (key 87). Position the feedback arm so that the pilot shaft (key 19A) will operate correctly in the slot of the feedback arm. For actuator travels between 19 and 30 mm (0.75 and 1.18 inches), position the feedback arm so that the long portion of the feedback arm slot, when fastened to the connector bracket, is closest to the positioner (see figure 8). For travels greater than 30 mm (1.18 inches) reverse the feedback arm so the slot in the feedback arm is opposite the positioner (see figure 8).
4. Attach the feedback arm (key 88) to the connector bracket (key 87) using machine screws, washers and hex nuts (keys 91, 92 and 93), but do not tighten the hex nuts.
5. Unscrew the two machine screws (key 24), and remove the positioner cover (key 21).
6. As shown in figure 5, a thin knockout section is cast across the mounting hole in the housing. Check to make certain that this knockout section has been removed. If the knockout section has not been removed, use a punch to knock it out.
7. Set the actuator at mid-travel using a manual loading regulator.
8. Install the stud clamp (key 83) in the mounting bracket (key 82). Place the mounting bracket against the outside of the actuator leg. Attach the two U-bolts (key 84) and the mounting bracket to the actuator leg using washers and hex nuts (key 85 and 86), but do not tighten the nuts. Depending on the positioner action, it may be necessary to straddle the travel indicator scale located on the inside of the actuator leg.

Note

Do not install the range spring in the following step. Feedback lever assembly (key 19) installation in the next step is only temporary to permit verifying alignment.

Figure 7. Positioner Mounting on Fisher 657 and 667 Actuators

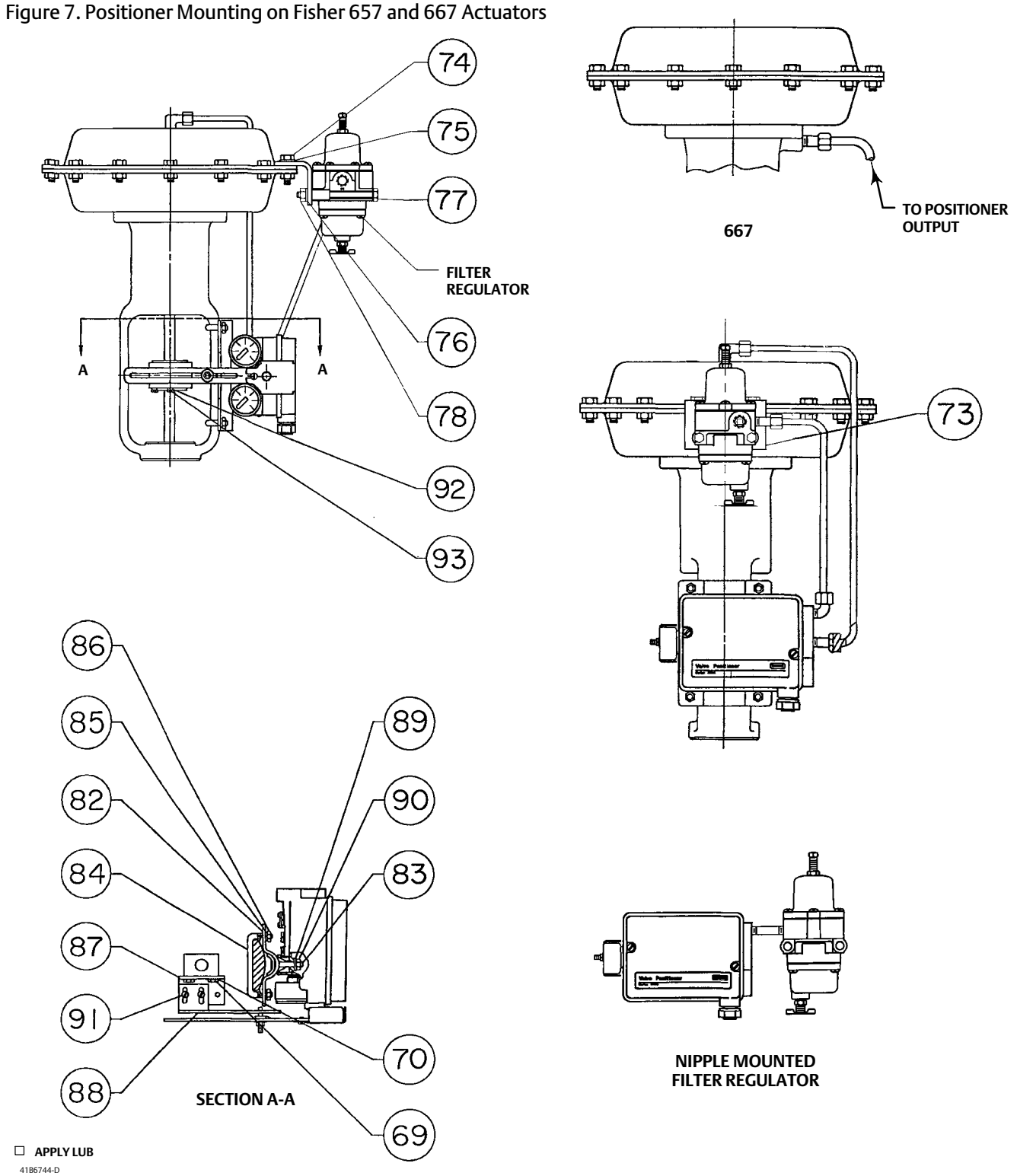
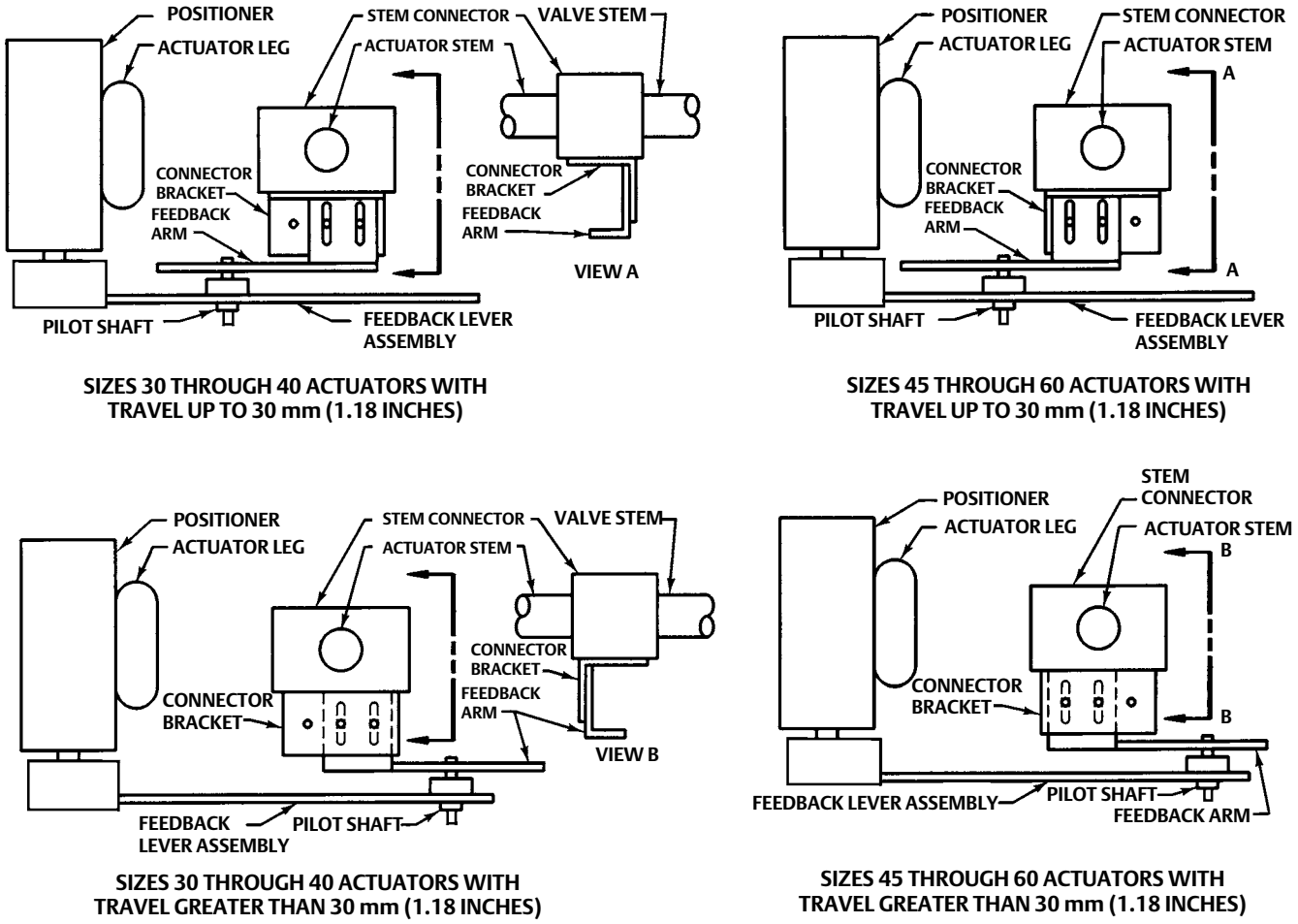


Figure 8. Feedback Arm Orientation with Positioner Mounted on Fisher 657 and 667 Actuators


POSITIONER
ACTUATOR LEG
STEM CONNECTOR
ACTUATOR STEM
VALVE STEM
CONNECTOR BRACKET
FEEDBACK ARM
VIEW A
PILOT SHAFT
FEEDBACK LEVER ASSEMBLY
SIZES 30 THROUGH 40 ACTUATORS WITH TRAVEL UP TO 30 mm (1.18 INCHES)
SIZES 45 THROUGH 60 ACTUATORS WITH TRAVEL UP TO 30 mm (1.18 INCHES)
VIEW B
FEEDBACK LEVER ASSEMBLY
SIZES 30 THROUGH 40 ACTUATORS WITH TRAVEL GREATER THAN 30 mm (1.18 INCHES)
STEM CONNECTOR
ACTUATOR STEM
B
FEEDBACK ARM
SIZES 45 THROUGH 60 ACTUATORS WITH TRAVEL GREATER THAN 30 mm (1.18 INCHES)
B2256-1

9. Attach the positioner to the stud clamp (key 83) using the sealing washer and hex nut (keys 89 and 90), but do not tighten the nut. Visually center the center line of the slot in the feedback arm (key 88) with the center line of the hole in the housing. Then, tighten the nuts (keys 90 and 86) only tight enough to prevent the positioner and mounting bracket from moving on the actuator leg. Locate the feedback lever assembly (key 19) so it may be temporarily installed into the positioner housing (key 1) and the feedback arm (key 88) to verify alignment. Do not install the range spring at this time. Place the pilot shaft (key 19A) in the slot of the feedback arm, and, at the same time, insert the feedback shaft in the hole of the positioner housing. Depress the feedback lever assembly inward until it stops against the housing. Make certain the slots in both the feedback lever assembly and feedback arm are horizontal and that the feedback lever assembly and the feedback arm are parallel with each other. If necessary, correct alignment by loosening the hex nuts (keys 86 and 90) and either moving the stud clamp in the mounting bracket or moving the mounting bracket on the actuator leg.
10. Tighten the nuts that were not tightened in the previous steps.
    a. Tighten the hex nut (key 90) to secure the positioner to the stud clamp (key 83).
    b. Tighten the four hex nuts (key 86) to secure the mounting bracket (key 82) to the actuator leg.

c. Tighten the machine screws and hex nuts (key 91 and 93) to secure the feedback arm (key 88) to the connector bracket (key 87).

d. Tighten the hex head screws (key 69) to secure the connector bracket (key 87) to the actuator stem connector.

11. Install the feedback lever assembly and range spring.

Feedback Lever Assembly and Range Spring Installation

Key numbers are shown in either figure 24 for the 3660 positioner or figure 25 for the 3661 positioner. Key numbers for the feedback lever assembly are shown in figure 26.

CAUTION

The range spring (key 30) and feedback lever assembly (key 19) must be installed together. Installing the range spring after the feedback lever assembly is installed may result in damage to the lever assembly (key 17) flexures.

1. Refer to figure 9. Loosen the retaining screw (key 19P) located in the positioner housing until it is fully retracted into the housing.
2. On the feedback lever assembly (key 19), loosen the zero adjustment screw (key 19S) until it is fully retracted into the clinch nut.
3. On the feedback lever assembly, loosen the hex nut (key 19D) so the pilot shaft (key 19A) moves freely in the slot.

CAUTION

In the next step, be sure the feedback spring (key 19N) hooks on the spring pin (key 19R) opposite the zero adjustment screw. If the feedback spring does not hook on the spring pin correctly, the feedback spring may be damaged during feedback lever assembly (key 19) installation.

4. Refer to figure 10. Verify that the feedback spring in the feedback lever assembly bushing is hooked on the end of the spring pin opposite the zero adjustment screw.

Note

When installing the feedback lever assembly bushing, be sure the anti-rotating slot aligns with the retaining screw (key 19P).

5. Position the feedback lever assembly (key 19) so that the pilot shaft (key 19A) will rest on the feedback plate or slide into the slot of the feedback arm (key 88) after installation.
6. Be sure the anti-rotating slot aligns with the retaining screw (key 19P), then install the feedback lever assembly bushing partially into the positioner.

   Slight tension on the feedback spring (key 19N) may be required to get the anti-rotating slot to align with the retaining screw.

CAUTION

The reason for partially sliding the feedback lever assembly (key 19) into the housing is to permit installing the range spring (key 30) without damaging the lever assembly (key 17) flexures. Installing the range spring after the feedback lever assembly is completely installed may damage the lever assembly flexures.

Figure 9. Installing the Feedback Lever Assembly (Key 19) on the Positioner

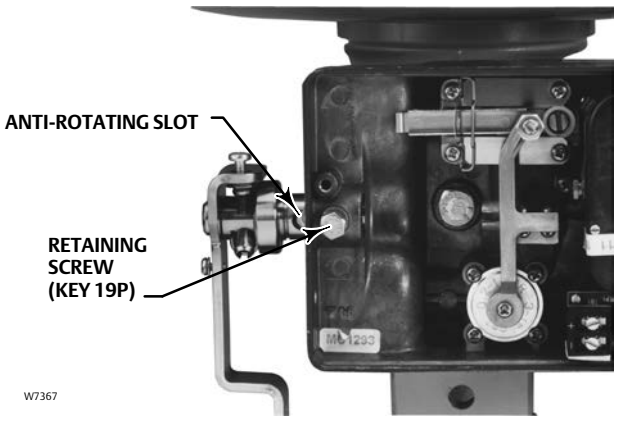
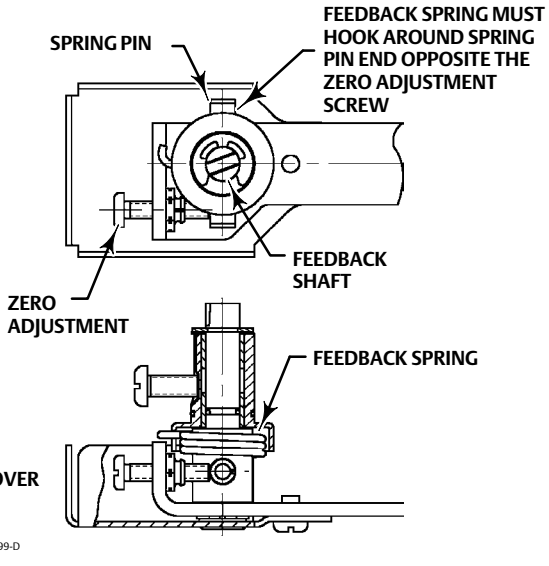


Figure 10. Positioning Feedback Spring



7. Tighten the retaining screw (key 19P) until the screw engages the anti-rotating slot so that the bushing does not rotate, but leave the screw loose enough so that the bushing can slide freely into the housing.
8. Refer to figures 11 and 12. Select the appropriate range spring (key 30) from tables 7 and 8. Place the range spring in the positioner so that one end of the spring is fully in the lever assembly slot. Next, rotate the feedback lever assembly so that:
   - the other end of the range spring aligns with the slot in the feedback shaft, and
   - the pilot shaft (key 19A) is either above or below the actuator feedback plate or engages the slot in the feedback arm (key 88).

Note

The feedback lever assembly bushing will no longer slide freely in the housing after it is placed in the normal operating position due to the side loading of the retaining screw (key 19P) on the anti-rotating slot.

9. Center the range spring (key 30) in the lever assembly (key 17) and feedback shaft slots; then push the feedback lever assembly bushing into the housing far enough so that the spring is retained without holding it.

Figure 11. Range Spring Installation

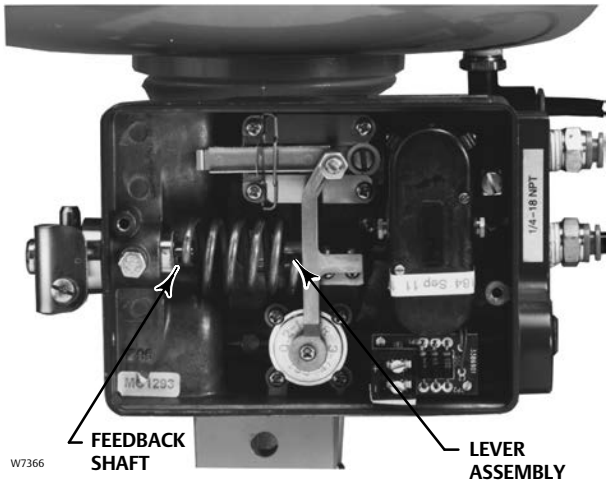
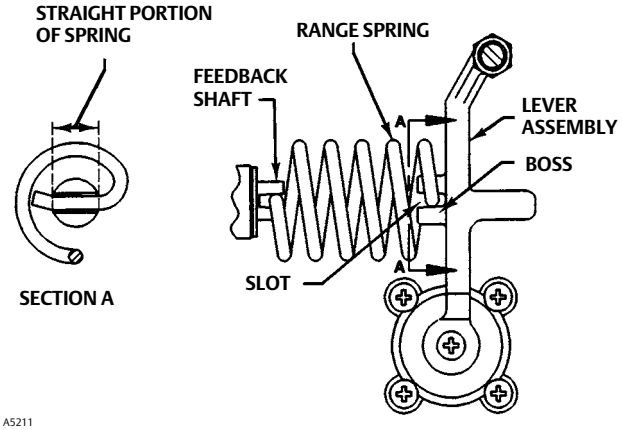


Figure 12. Range Spring Alignment



CAUTION

Installation of the feedback lever assembly (key 19) prior to installation of the range spring (key 30) may result in damage to the lever assembly (key 17) flexures. The range spring must be in place before pushing the feedback lever assembly bushing fully into the positioner housing.

10. Ensure the range spring (key 30) is properly aligned as shown in figure 12, then, as shown in figure 13, place hands on both sides of the positioner and press firmly until the feedback lever assembly bushing shoulder is against the positioner housing (figure 14).
11. While holding the feedback lever assembly bushing securely against the housing, tighten the retaining screw (key 19P). The feedback lever assembly bushing should be tight against the positioner housing as shown in figure 14.

Figure 13. Pressing the Feedback Lever Assembly Bushing into the Positioner

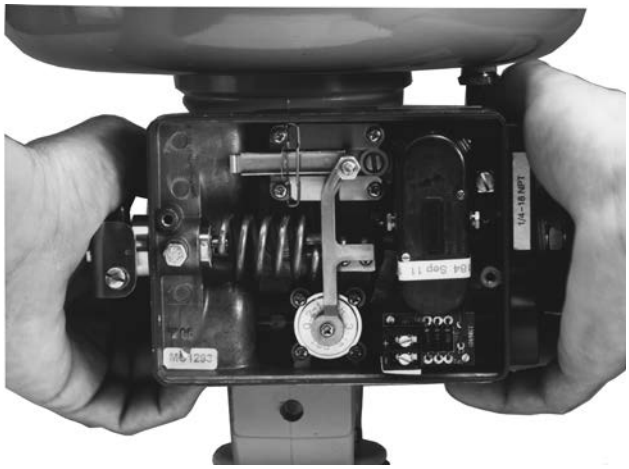
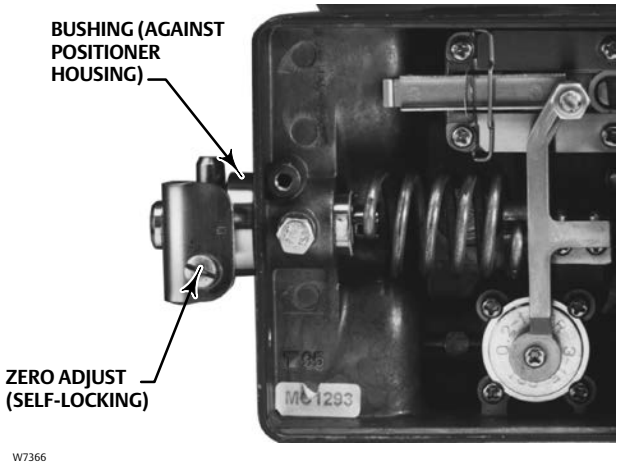


Figure 14. Feedback Lever Assembly in Operating Position



12. Move the pilot shaft (key 19A) to the approximate span position shown in table 8.

Note

To ensure proper positioner performance, make certain, after alignment and all tightening is completed, that there is clearance between the face of the pilot shaft and the feedback arm.

13. Install the feedback lever assembly cover (key 19T) with cover screw (key 19U).
14. Verify the positioner action. Note the letters D and R on the flapper (key 10). If the letter D is nearest the adjustment screw (key 18), the positioner is set for direct action. To change the positioner action, refer to the Changing Positioner Action procedure in the Maintenance section. If the action is changed, complete the Calibration section before putting the unit into operation.
15. Install the positioner cover (key 21) and secure with the two machine screws (key 24). Make certain the Fisher logo reads correctly and the vent is pointing downward. Continue with the Pressure Connections section.

Pressure Connections

Installing a 3660 or 3661 positioner requires tubing and pressure fittings. The fittings, tubing, and mounting parts required depend on the type number and optional equipment, such as filter/regulator and bypass valve. See figure 15 for the location of the positioner pressure connections.

⚠ WARNING

The positioner is capable of providing full supply pressure to connected equipment. To avoid personal injury and property damage caused by parts bursting from system overpressure, make sure the supply pressure never exceeds the maximum safe working pressure of any connected equipment.

Supply Connection

⚠ WARNING

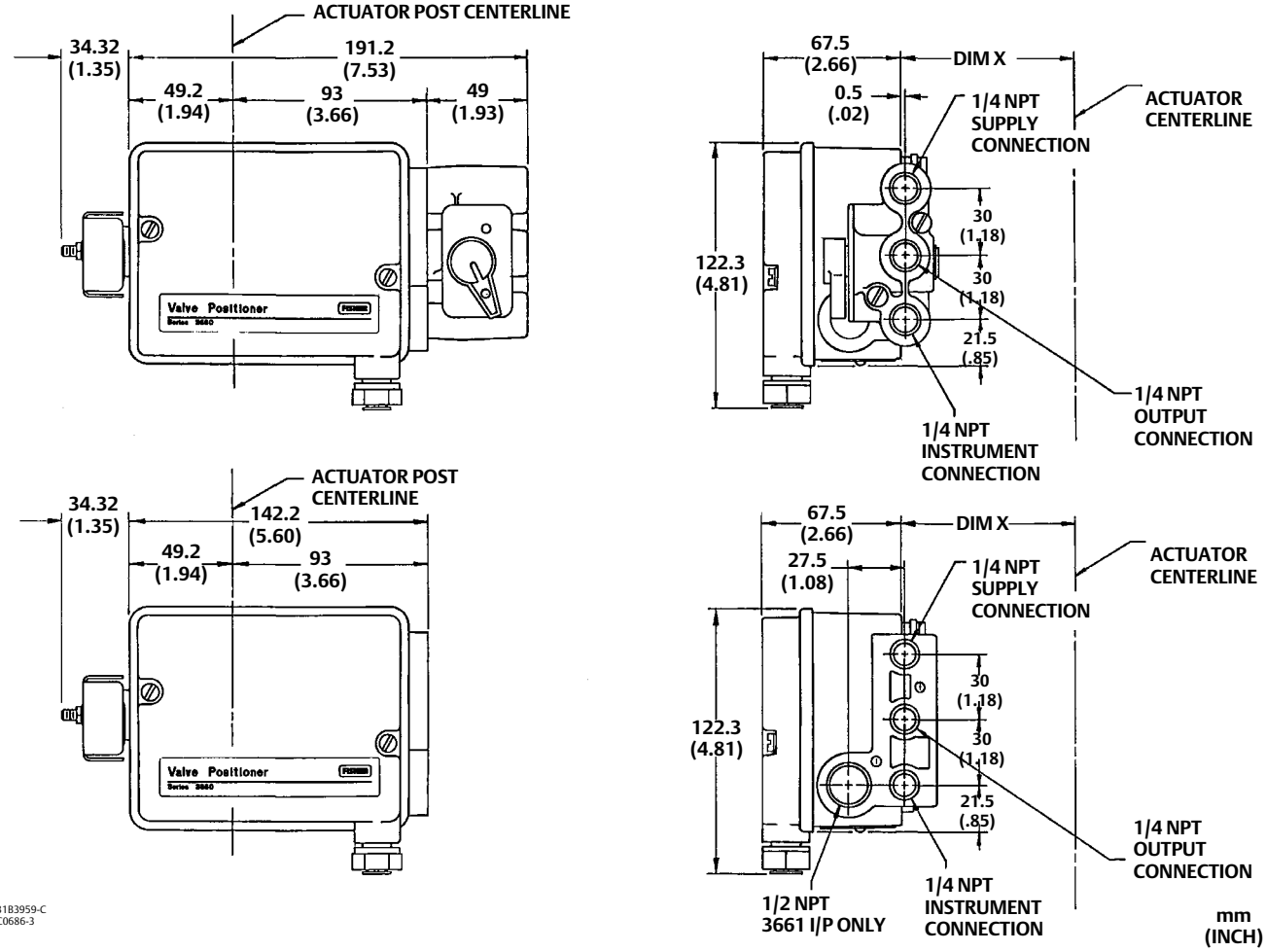
Severe personal injury or property damage may occur if the instrument air supply is not clean, dry and oil-free. While use and regular maintenance of a filter that removes particles larger than 40 micrometers in diameter will suffice in most applications, check with an Emerson Process Management field office and industry instrument air quality standards for use with corrosive air or if you are unsure about the proper amount or method of air filtration or filter maintenance.

CAUTION

The O-rings used in 3660 and 3661 positioners are made of EPDM (ethylene propylene). Use a clean, dry, oil-free air supply with instruments containing EPDM components. EPDM is subject to degradation when exposed to petroleum-based lubricants.

Figure 15. Typical Mounting Dimensions and Connections

ACTUATOR CENTERLINE TO POSITIONER			
Type	**Size**	**Dimension X**	
		mm	**Inch**
657/667	30	92.2	3.63
	34	95.3	3.75
	40	104.9	4.13
	45/46	108.0	4.25
	50/60	128.5	5.06
1250	30	86.0	3.39
	34	86.0	3.39
	45	110.0	4.33
3024S	1.21	83.5	3.29
	1.31	87.5	3.44
	1.41	87.5	3.44
Baumann	16in^2	53.8	2.12
	32in^2	71.4	2.81
	54in^2	71.4	2.81
	70in^2	71.4	2.81
GX	225	81.0	3.19
	750	81.0	3.19
	1200	81.0	3.19



Connect a clean, dry, oil-free air source to the supply connection of the positioner. Use 3/8-inch tubing or 1/4 NPT pipe for the supply line. A supply air filter or a filter regulator capable of removing particles 40 micrometers in diameter is recommended. The supply pressure should not exceed the following limits:

1. For the positioner, do not exceed the maximum pressure rating of 6.2 bar (90 psig).
2. For actuator pressure, refer to the appropriate actuator instruction manual for maximum allowable pressures.
3. For the valve body assembly, do not exceed the maximum allowable thrust of the specific valve.

Output Connection

Connect the OUTPUT connection to the actuator diaphragm casing connection. Use 3/8-inch, 1/4-inch, or 6 mm tubing, or 1/4 NPT pipe between the actuator and the positioner.

Instrument Connection

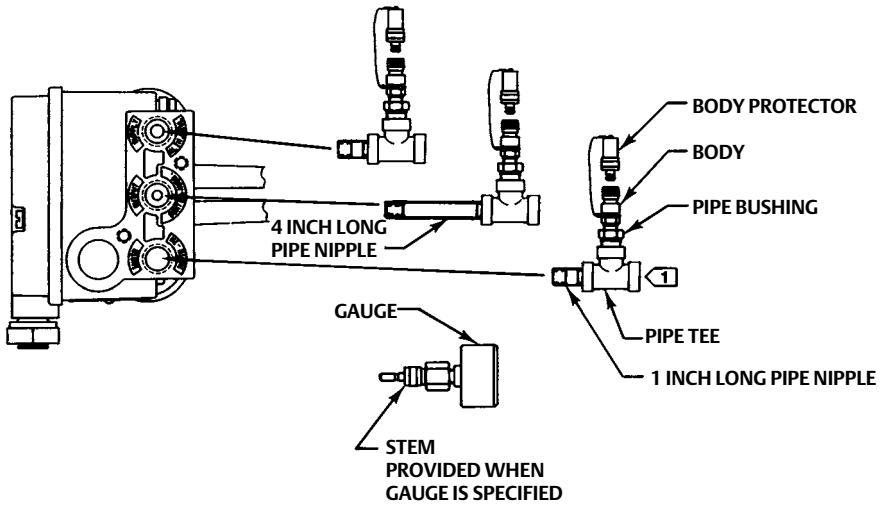
Connect the control device output to the positioner INSTRUMENT connection. Use 3/8-inch tubing to 1/4 NPT pipe.

The 3661 electro-pneumatic positioner requires a 4-20 milliampere DC current input signal from the control device. For connections to the 3661, refer to the Electrical Connections for 3661 Positioners section.

Diagnostic Connections

To support diagnostic testing of valve/actuator/positioner packages, special connectors and hardware are available. Typical connector installations are shown in figure 16. The hardware used includes 1/4 NPT pipe nipples and pipe tees with 1/8 NPT pipe bushings for the connectors. The connectors consist of 1/8 NPT bodies and body protectors. If the diagnostic connectors are ordered for a positioner with gauges, 1/8-inch stems are also included.

Figure 16. FlowScanner™ Valve Diagnostic System Connections



NOTE:
1 PIPE TEE, NIPPLE, BUSHING, BODY AND PROTECTOR NOT REQUIRED FOR THE 3661 POSITIONER

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A6084

Install the connectors and hardware between the 3660 or 3661 positioner and the actuator.

1. Before assembling the pipe nipple, pipe tee, pipe bushings, actuator piping, and connector body, apply sealant to all threads. Sealant is provided with the diagnostic connectors and hardware.
2. Turn the pipe tee to position the connector body and body protector for easy access when doing the diagnostic testing.

Vent Connection

3660 and 3661 positioners are equipped with a 1/4 NPT vent connection in the cover.

Electrical Connections for 3661 Positioners

⚠ WARNING

For intrinsically safe installations, refer to the loop schematics shown in figures 27 and 29, factory drawings, or to instructions provided by the barrier manufacturer for proper wiring and installation.

Select wiring and/or cable glands that are rated for the environment of use (such as hazardous area, ingress protection, and temperature). Failure to use properly rated wiring and/or cable glands can result in personal injury or property damage from fire or explosion.

Wiring connections must be in accordance with local, regional, and national codes for any given hazardous area approval. Failure to follow the local, regional, and national codes could result in personal injury or property damage from fire or explosion.

Refer to figures 17 and 18 when making electrical connections. Use the 1/2 NPT conduit connection for installation of field wiring. Run the input wires through the conduit, and connect the positive wire from the control device to the positioner + terminal and the negative wire from the control device to the positioner - terminal. Do not over tighten the terminal screws. The maximum torque is 0.45 N•m (4 lbf•in.).

Figure 17. Equivalent Circuit

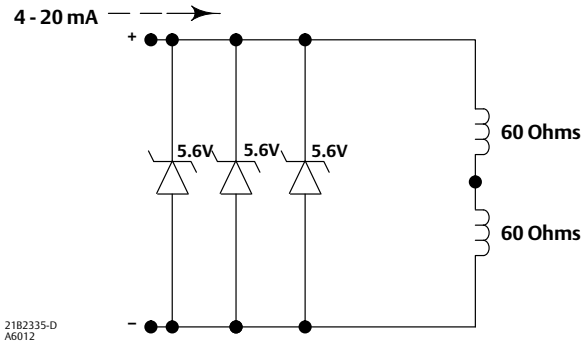
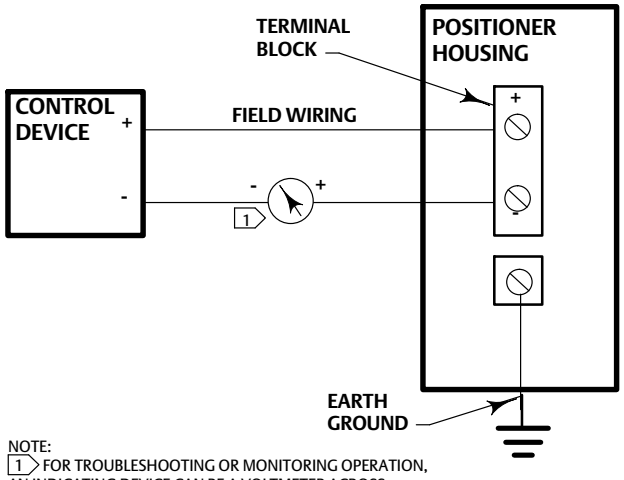


Figure 18. Typical Field-Wiring Diagram



Calibration

The following calibration procedures are for the adjustment of the pneumatic positioner. For the 3661 positioner, there are no adjustments within the converter portion of the positioner. All adjustments are accomplished within the pneumatic portion of the positioner.

⚠ WARNING

During calibration the valve may move. To avoid personal injury and property damage caused by the release of pressure or process fluid, provide some temporary means of control for the process.

Refer to figure 24 (3660) or figure 25 (3661) for key number locations unless otherwise indicated. Adjustment locations are shown in figure 19.

1. If mounting a new positioner on an actuator or if the positioner action has not been changed, do not perform steps 2 through 7.
2. If the positioner action has been changed or if the positioner has had maintenance performed on it, complete steps 3 through 17.
3. If the cover (key 21) has not been removed, unscrew the two machine screws (key 24), and remove the cover.
4. Release all pressure from the positioner. Disconnect the positioner output tubing to the actuator. If the positioner is equipped with an output gauge, plug the positioner output connection. If the positioner is not equipped with an output gauge, provide a gauge to monitor positioner output and connect it to the positioner output connection.
5. Set the supply pressure to the required setting. Set the gain (proportional band) adjustment screw at a nominal value by turning it clockwise until it stops, and then turning it counterclockwise 1 turn.

Note

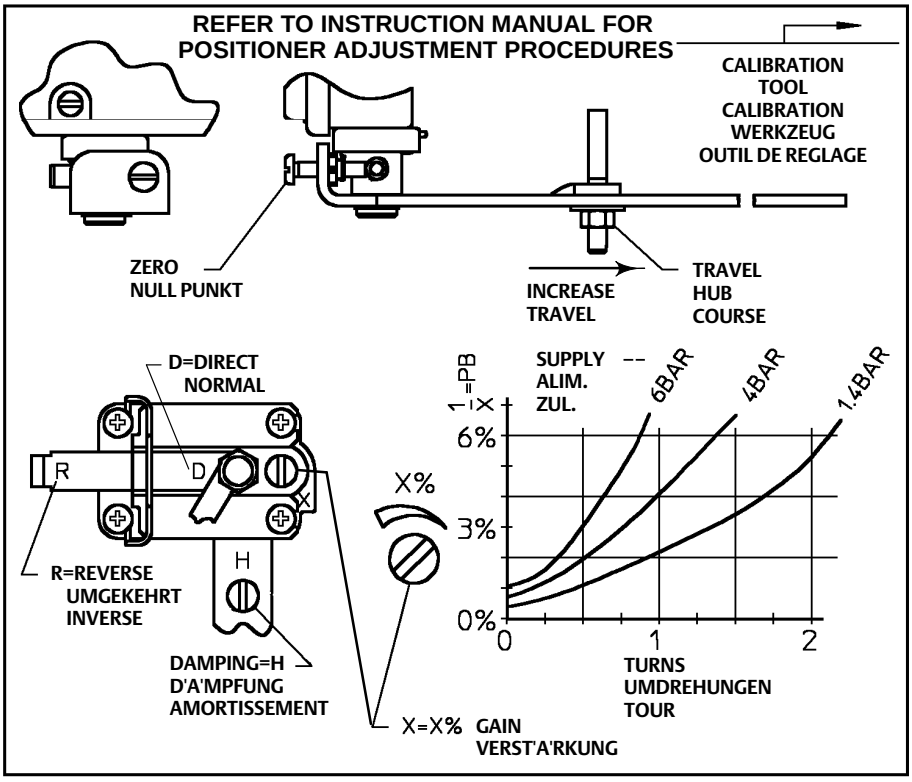
Adjusting the gain (PB) adjustment changes the nozzle flapper relationship. This nozzle flapper change affects the actuator/positioner response time.

Note

To improve holding of the calibration tool as used in step 6, the actuator may be used to create the load (manual pressure) by winding up the positioner range spring. The direction of windup, looking at the spring from outside the housing, must be clockwise. This windup will create a torsional force over the input diaphragm through the lever assembly. The spring is automatically wound up in two of the positioner/actuator mounting positions when the loading pressure is removed. These are left-hand mounting on a spring-to-close actuator and right-hand mounting on a spring-to-open actuator (refer to figure 2). In the other two mounting positions, the actuator must be pressurized to 100 percent input to create the spring holding force.

6. Remove the calibration tool (key 6) from the cover. Place the calibration tool between the lever assembly (key 17) and the input diaphragm assembly (key 28). When making the following adjustment, apply manual pressure to the lever assembly over the input diaphragm assembly to hold the calibration tool in place. Loosen the lock nut (key 57), and turn the adjusting screw (key 18) until the output is 50% ± 10% of supply pressure. For example, if supply pressure is 2.4 bar, set the output to 1.2 bar ± 0.24 bar.
7. Lock the adjusting screw (key 18) with the lock nut (key 57). After the adjustment is complete, remove the calibration tool and replace it in the positioner cover.

Figure 19. Adjustment Locations (Equivalents of Pressures Shown in This Drawing are: 6 bar = 86 psig, 4 bar = 58 psig, and 1.4 bar = 20 psig)



8. Release all pressure from the positioner. Remove the plug or the gauge that was installed in step 4, and reconnect the output tubing to the actuator.
9. Turn on supply pressure. Set the input signal to the minimum value.
10. Remove the cover (key 19T) from the feedback lever assembly (key 19).
11. Set the travel (span) adjustment to the desired actuator travel by loosening the hex nut (key 19D) and sliding the pilot shaft (key 19A) to the desired setting on the feedback lever assembly (key 19). The travel settings are marked in millimeters on the feedback lever assembly.
12. Set the gain (PB) adjustment and/or the output volume damping adjustment to a setting that provides the best actuator/positioner response. Observe the gain dependency on the air supply pressure as shown in the graph of figure 19. The gain adjustment restrictor for air delivery should be fully open for large size actuators and adjusted to a mid-value for smaller size actuators with 225 cm^2 (35 square inches) or less diaphragm area. Start by setting the gain adjustment at approximately one turn open, and, if the output volume damping adjustment is used, turn it clockwise to decrease the air delivery.
13. Adjust the valve stem position by rotating the zero adjustment screw (key 19S).
14. Set the input signal to the maximum value.

15. Readjust the travel (span) adjustment to achieve correct actuator travel.

Note

When a travel (span) adjustment is made, there will be a zero shift.

16. Repeat steps 11 through 15 as necessary to achieve correct actuator travel.
17. Install the cover (key 19T) on the feedback lever assembly (key 19) with cover screw (key 19U).
18. Install the positioner cover (key 21) and secure with the machine screws (key 24). Make sure the Fisher logo reads correctly and the vent is pointing downward.

Split-Range Operation

3660 and 3661 positioners can be used for split-range operation with the instrument input signal from a single controller or another instrument split between two or three control valves. Tables 7 and 8 show some typical split ranges for the positioners. To change from a full range to a split range, change the range spring (key 30, figure 24 or 25) to the appropriate spring shown in the tables. Complete the Changing Range Spring portion of the Maintenance section. Refer to tables 7 and 8 for valve stem travel available with split range operation.

Table 7. Range Spring Selection for Fisher Actuators

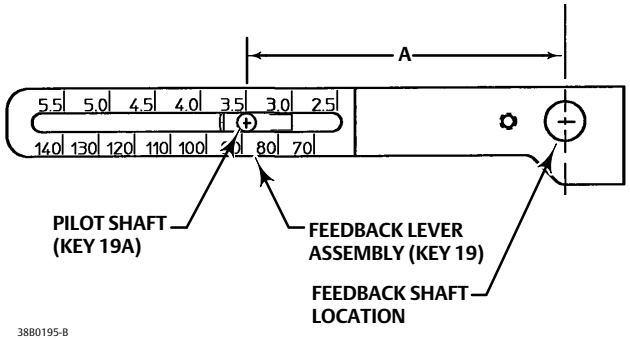
TYPE	3660		3660		3661	VALVE STEM TRAVEL WHEN USING 3660 AND 3661		RANGE SPRING PART NUMBER (KEY 30)
Split	0.2 to 1.0 bar (3 to 15 psig) Input Signal		0.4 to 2.0 bar (6 to 30 psig) Input Signal		4 to 30 mA DC Input Signal			
	Bar	Psig	Bar	Psig		mm	Inches	
One Way 1:1	0.2 to 1.0	3 to 15	0.4 to 2.0	6 to 30	4 to 20	19 to 50	0.75 to 2.0	11B3880X012
Two Way 2:1	0.2 to 0.6 0.6 to 1.0	3 t0 9 9 to 15	0.4 to 1.2 1.2 to 2.0	6 to 18 18 to 30	4 to 12 12 to 20	19 to 50	0.75 to 2.0	11B3881X012
Three Way 3:1	0.2 to 0.5 0.5 to 0.8 0.8 to 1.0	3 to 7 7 to 11 11 to 15	0.4 to 1.0 1.0 to 1.5 1.5 to 2.0	6 to 14 14 to 22 22 to 30	4 to 9.33 9.33 to 14.66 14.66 to 20	15 to 33.3	0.591 to 1.311	11B3881X012

Table 8. Range Spring Selection for Baumann Actuators

TYPE	3660				3661		VALVE STEM TRAVEL			
Split	0.2 to 1.0 bar (3 to 15 Psig) Input Signal		0.4 to 2.0 bar (6 to 30 Psig) Input Signal		4 to 20 mA DC Input Signal		12.7 to 19 mm (1/2 to 3/4 inch)		19.1 to 50 mm (3/4 to 2 inch)	
	Range Bar (Psig)	Span Bar (Psi)	Range Bar (Psig)	Span Bar (Psi)	Range mA	Span mA	Range Spring Part Number (key 30)	Approximate Pilot Shaft Setting(1) mm (Inch)	Range Spring Part Number (key 30)	Approximate Pilot Shaft Setting(1) mm (Inch)
One Way 1:1	0.2 to 1.0 (3 to 15)	0.8 (12)	0.4 to 2.0 (6 to 30)	1.6 (24)	4 to 20	16	17B0662X012	89 (3.50)	17B0662X012	129 (5.09)
Two Way 2:1	0.2 to 0.6 (3 to 9) 0.6 to 1.0 (9 to 15)	0.4 (6)	0.4 to 1.2 (6 to 18) 1.2 to 2.0 (18 to 30)	0.8 (12)	4 to 12 12 to 20	8	11B3880X012	92 (3.63)	11B3881X012	92 (3.63)
Three Way 3:1	0.2 to 0.5 (3 to 7) 0.5 to 0.8 (7 to 11) 0.8 to 1.0 (11 to 15)	0.3 (4)	0.4 to 0.97 (6 to 14) 0.97 to 1.5 (14 to 22) 1.5 to 2.0 (22 to 30)	0.55 (8)	4 to 9.33 9.33 to 14.66 14.66 to 20	5.33	11B3881X012	70 (2.75)	11B3881X012	137 (5.38)
Four Way 4:1	0.2 to 0.4 (3 to 6) 0.4 to 0.6 (6 to 9) 0.6 to 0.8 (9 to 12) 0.8 to 1.0 (12 to 15)	0.2 (3)	0.4 to 0.8 (6 to 12) 0.8 to 1.2 (12 to 18) 1.2 to 1.6 (18 to 24) 1.6 to 2.0 (24 to 30)	0.4 (6)	4 to 8 8 to 12 12 to 16 16 to 20	4	11B3881X012	95 (3.75)	---	---

1. Pilot shaft setting is the A dimension in figure 20.

Figure 20. Pilot Shaft Setting



3660 Bypass Operation

3660 positioners may be supplied with a bypass assembly.

CAUTION

Do not use bypass operation when the positioner is reverse acting or is in split-range operation. In these cases, bypassing the positioner sends the input signal directly to the actuator. Such a change will affect the desired operation and possibly

upset the system. Use bypass operation only when the instrument signal range is the same as the positioner output range required for normal actuator operation.

Labels on the bypass body assembly (key 41, figure 23), and a pointer on the bypass lever (key 42 in figure 23) indicate if the input signal from the instrument goes to the positioner or directly to the control valve actuator.

With the pointer of the bypass lever over the word POSITIONER, the instrument pressure goes to the positioner and the output pressure of the positioner goes to the actuator.

With the pointer of the bypass lever over the word BYPASS, the instrument pressure goes directly to the actuator.

Note

A difference between the input signal pressure and the positioner output pressure could cause a transient bump in the controlled system when the bypass lever is moved to BYPASS.

With a reverse-acting or split-range positioner, the bypass lever may be secured in the POSITIONER position so that bypass cannot be used. To lock the bypass lever in the POSITIONER position, shut off the instrument and supply pressure to the positioner. Then, move the bypass lever (key 42 in figure 23) so the pointer is over the word POSITIONER. Align the hole in the pointer with the hole in the body assembly and thread the plastic wire tie (key 79 in figure 23) through both holes to secure the bypass lever.

Principle of Operation

Refer to figure 21 for the operational schematic.

The instrument pressure acts on the input module, which controls the flapper-nozzle system of the relay. Supply pressure is applied to the relay, and the output pressure of the relay is supplied to the control valve actuator.

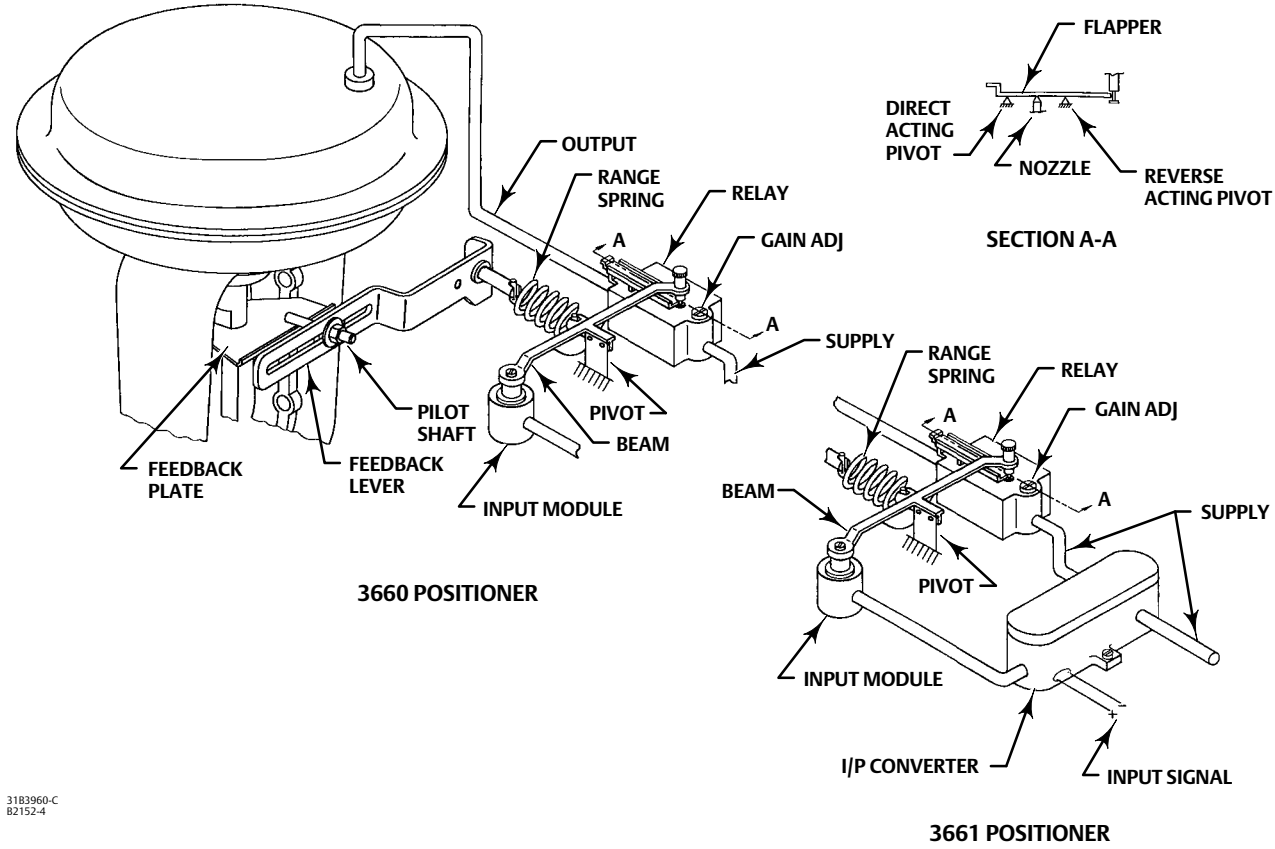
For a direct-acting positioner, increases in instrument pressure cause the input module to pivot the beam. The beam pivots the flapper and restricts the nozzle. The nozzle pressure increases and causes the relay assembly to increase output pressure to the actuator. With a direct-acting actuator, this increased pressure moves the actuator stem downward. Stem movement is fed back to the beam by means of a feedback lever and range spring, which causes the flapper to pivot slightly away from the nozzle to prevent any further increases in relay output pressure. The positioner is once again in equilibrium but at a higher instrument pressure, a slightly different flapper position, and a new actuator stem position.

A decrease in instrument pressure decreases nozzle pressure, which allows the relay to bleed off actuator loading pressure.

Operation of a reverse-acting positioner is similar except that the position of the flapper is reversed from that shown in figure 21. The reversed position uses the alternate flapper pivot point so that increases in instrument pressure rotate the flapper away from the nozzle to reduce nozzle pressure.

With a 3661 electro-pneumatic positioner, the electro-pneumatic (I/P) converter provides a 0.2 to 1.0 bar (3 to 15 psig) output pressure proportional to the 4-20 milliampere input signal. The 0.2 to 1.0 bar (3 to 15 psig) output pressure becomes the input signal pressure to the input module.

Figure 21. Operational Schematic



Maintenance

Positioner parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. The following procedure describes disassembly and reassembly of the positioner. When inspection or repairs are required, disassemble only those parts necessary to accomplish the job. When reassembly is complete, make adjustments as described in the Calibration section.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process fluid. Before performing any Maintenance procedures:

- **Always wear protective clothing, gloves, and eyewear to avoid personal injury.**
- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve.**

- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **For 3661 positioners in intrinsically safe areas, current monitoring during operation must be with an approved meter for hazardous areas in order to avoid personal injury or property damage caused by an explosion or fire.**
- **Check with your process or safety engineer for any additional measures that must be taken to prevent against process media.**

Changing the Positioner Action

This section explains changing the positioner action from direct to reverse or reverse to direct. With direct action, the positioner output pressure increases as the instrument input signal to the positioner increases. With reverse action, the positioner output pressure decreases as the input signal to the positioner increases. To change the action of a positioner that is already mounted on an actuator, remove the positioner from the actuator. Refer to the Removing the Positioner from Actuator section. Refer to figure 24 or 25 for key number locations.

1. Unscrew the two captive cover screws and remove the cover (key 21). Carefully lift the flapper spring at the location shown by key 10.
2. Slide out the flapper (key 9) and rotate it so that the desired letter (D or R for direct and reverse) is nearest the adjusting screw (key 18). When inserting the flapper, be sure the end of the flapper engages the groove in the end of the screw and that the flapper spring (key 10) sets into the V-notches of the flapper.
3. Mount the positioner to the opposite actuator leg as explained in the Positioner Mounting section and shown in figure 2.
4. Refer to the Calibration section of this manual for the calibration procedure.

Changing the Range Spring

Refer to figure 24 or 25 for key number locations.

1. Unscrew the two captive cover screws and remove the cover (key 21). Loosen the retaining screw (key 19P) and pull the feedback lever assembly (key 19) out slightly to release the range spring (key 30) tension.
2. Remove and replace the range spring (key 30).
3. Push the feedback lever assembly (key 19) back into position and retighten the retaining screw (key 19P).
4. Refer to the Calibration section for the calibration procedure.

Changing the Input Signal Range on 3660 Positioners

To change the input signal range from 0.2 to 1.0 bar (3 to 15 psig) to 0.4 to 2.0 bar (6 to 30 psig) or vice versa, change the input diaphragm assembly (key 28, figure 24) by performing the Changing the Input Module Diaphragm Assembly procedure in this Maintenance section.

Removing the Positioner from the Actuator

Center-Bolt Mounting on 1250, 1250R, 3024S, and Baumann Actuators

Refer to figure 24 or 25 for key number locations unless otherwise indicated.

⚠ WARNING

To avoid personal injury caused by electrical shock, disconnect electrical power to 3661 positioners.

1. Release all pressure from the positioner. Disconnect the supply, instrument, and output tubing. For 3661 positioners, disconnect the input wires and conduit.
2. Unscrew the two captive cover screws and remove the cover (keys 24 and 21). Loosen the retaining screw (key 19P).
3. Pull the feedback lever assembly (key 19) out slightly to release the range spring tension, and remove the range spring (key 30).
4. Loosen and remove the hex head screw and sealing washer (keys 72 and 71 in figure 3), and remove the positioner.
5. To mount the positioner on the actuator, refer to the Positioner Mounting section of this manual.

Clamp Mounting on 1250, 1250R, and 3024S Actuators

⚠ WARNING

To avoid personal injury caused by electrical shock, disconnect electrical power to 3661 positioners.

1. Release all pressure from the positioner. Disconnect the supply, instrument, and output tubing. For 3661 positioners, disconnect the input wires and conduit.
2. Unscrew and remove the hex nut and washer (keys 66 and 67 in figure 3), and remove the positioner.
3. To mount the positioner on the actuator, refer to the Positioner Mounting section.

Mounting Bracket/U-Bolt Mounting on 657, and 667 Actuators

Refer to figure 24 or 25 for key number locations unless otherwise indicated.

1. Release all pressure from the positioner. Disconnect the supply, instrument, and output tubing. For 3661 positioners, disconnect the input wires and conduit.
2. Unscrew the two captive cover screws and remove the cover (keys 24 and 21). Loosen the retaining screw (key 19P).
3. Pull the feedback lever assembly (key 19) out slightly to release the range spring tension, and remove the range spring (key 30).
4. Loosen and remove the hex nut and washer (keys 90 and 89, figure 7), and remove the positioner.
5. To mount the positioner on the actuator, refer to the Positioner Mounting section.

Changing the Input Module Diaphragm Assembly

Refer to figure 24 or 25 for key number locations.

1. Unscrew the two captive cover screws, and remove the cover (key 21). Loosen the retaining screw (key 19P) and pull the feedback lever assembly (key 19) out slightly to release the range spring (key 30) tension.
2. Remove the cheese head screw (key 7) from the beam and diaphragm assembly (key 28).
3. There are four cheese head screws (key 7) holding the diaphragm assembly (key 28) to the housing. Remove the two cheese head screws (key 7) nearest the feedback lever assembly (key 19) and loosen the two remaining cheese head screws (key 7). Slide the diaphragm assembly (key 28) out from between the lever assembly (key 17) and the housing.
4. Install the new diaphragm assembly (key 28), and secure with the four cheese head screws (key 7).
5. Depress the feedback lever assembly (key 19) inward until it stops on the housing, and tighten with the retaining screw (key 19P).

6. With the input pressure set at either 1.4 or 2.4 bar (20 or 35 psig), check for leaks between the diaphragm assembly and the housing.
7. Refer to the Calibration section for the calibration procedure.

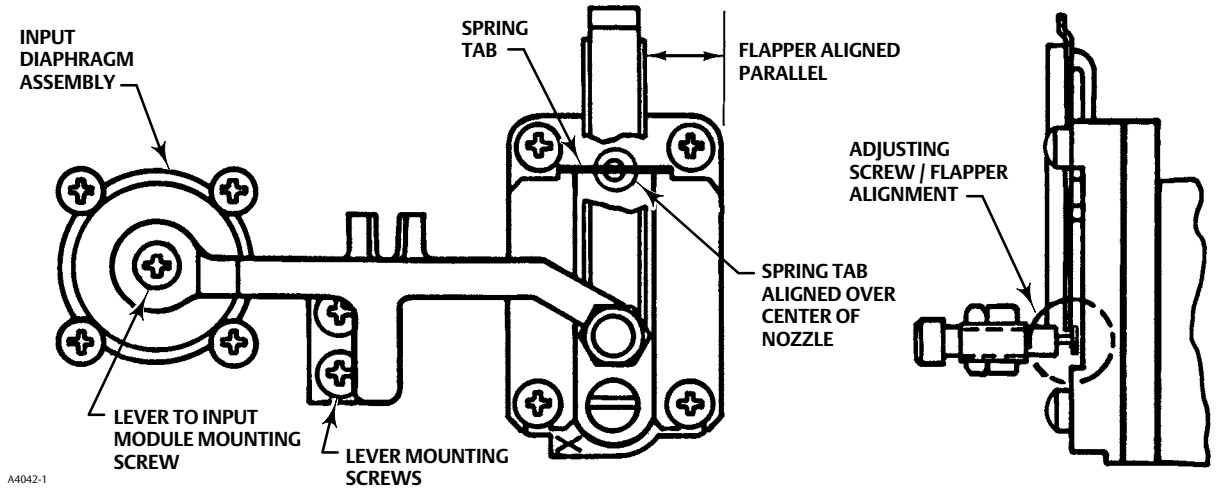
Disassembling and Assembling Relay Components

Before disassembling the relay components, remove the positioner from the actuator. Refer to the Removing the Positioner from the Actuator section. Refer to figure 24 or 25 for key number locations.

1. To disassemble the relay valve assembly (key 2) or restrictor assembly (key 4), unscrew these parts from the back of the positioner and replace with new parts.

   The relay valve assembly (key 2) and the restrictor assembly (key 4) are marked with the letters V and P, respectively on the removal screws. For correct location purposes, these same letters appear on the back of the positioner case.
2. Unscrew the two captive cover screws, and remove the cover. Loosen the retaining screw (key 19P) and pull the feedback lever assembly (key 19) out slightly to release the range spring (key 30) tension. Remove the range spring (key 30).
3. Remove the cheese head screw (key 7) from the lever assembly (key 17) and the diaphragm assembly (key 28).
4. Remove the two cheese head screws (key 7) that hold the lever assembly (key 17) to the housing and lift off the lever.
5. Remove the four cheese head screws (key 11) and four washers (key 98). Lift off the flapper (key 9), flapper spring stop (key 99), flapper spring (key 10) and cover plate assembly (key 8). Lift out the output diaphragm assembly (key 29) and spring (key 3).
6. Reassemble the relay parts in the following order, spring (key 3), output diaphragm assembly (key 29), cover plate assembly (key 8), flapper spring (key 10), and flapper spring stop (key 99). Install the four washers (key 98) and four cheese head screws (key 11), and then tighten the screws. When tightening the two screws that secure the flapper spring (key 10), position the spring so the spring tab is aligned over the center of the nozzle and the flapper is parallel as shown in figure 22.

Figure 22. Flapper and Lever Alignment



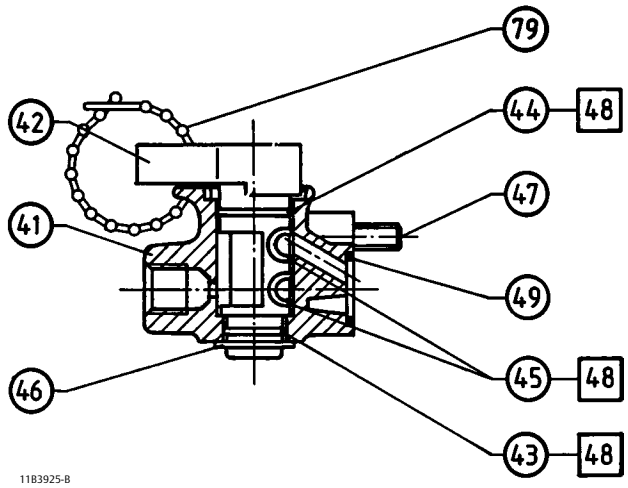
7. Reassemble the lever assembly (key 17) with the two cheese head screws (key 7). Do not tighten the screws until the adjusting screw (key 18) to flapper (key 9) and tapped hole in the diaphragm assembly (key 28) are aligned (refer to figure 22). Then, tighten the lever assembly and install the screw in the diaphragm assembly.

8. Carefully lift the flapper spring at the location shown by key 10. Install the flapper (key 9) so that the desired letter (D or R for direct and reverse) is nearest the adjusting screw (key 18). When inserting the flapper, be sure the end of the flapper engages the grove in the end of the screw, and that the flapper spring (key 10) sets into the V-notches of the flapper.
9. With the flapper (key 9) in place, visually ensure that it is aligned parallel to the cover plate assembly (key 8) as shown in figure 22. Realign if necessary by repositioning the flapper spring (key 10). The flapper alignment affects the performance of the positioner. Be careful not to damage the lapped surfaces on the cover plate and nozzle.
10. Reinstall the range spring (key 30). Push the feedback lever assembly (key 19) back into position and retighten the retaining screw (key 19P).
11. With the output at supply pressure, check the output diaphragm assembly joints for leaks.
12. Refer to the Calibration section for the calibration procedure.

Disassembling and Assembling the Bypass Valve

During the following bypass valve disassembly and assembly procedures, refer to figure 23, unless otherwise indicated.

Figure 23. Fisher 3660 Bypass Valve



1. Remove all pressure from the positioner. Disconnect the supply, instrument and output tubing.
2. Remove the two cheese head screws (key 47). Lift the bypass valve from the positioner being careful not to loose the three O-rings (key 49).
3. Remove the plastic wire tie (key 79) and retaining ring (key 46).
4. Using a gentle pulling and turning motion, slide the bypass lever assembly (key 42) from the bypass body (key 41).
5. Inspect the O-rings (keys 43, 44, 45 and 49) for nicks and wear, and replace as necessary. When installing new O-rings (keys 43, 44 and 45) on the shaft of the bypass lever assembly, lubricate them sparingly using lubricant (key 48).
6. Install the bypass lever assembly (key 42) into the body assembly (key 41) using a gentle turning and pushing motion to avoid nicking an O-ring.
7. Install the retaining ring (key 46).

8. Install the three O-rings (key 49) into the body assembly (key 41) and then carefully attach the body assembly to the positioner using the two cheese head screws (key 47).
9. Turn the bypass lever (key 42) to the appropriate POSITIONER or BYPASS position, and secure with the plastic wire tie (key 79).
10. Reconnect the supply, instrument and output tubing, and turn on pressure to the positioner.

Replacing the 3661 Converter Module

Refer to figure 25 for key number locations. After replacing the converter module, re-calibrate the positioner.

1. Remove the cover and disconnect the input signal wires from the terminal strip.
2. Loosen the two captive screws securing the converter to the positioner housing, and lift out the converter module (key 100).
3. When replacing the converter module, the restrictor assembly (key 35) also should be replaced. Before the restrictor assembly can be removed, remove the positioner from the actuator. Refer to the Removing the Positioner from the Actuator section.
4. Remove and replace the restrictor assembly (key 35). This assembly is marked with the letters EP on the removal screw. For location purposes, the same letters appear on the back of the positioner case.
5. To mount the positioner on the actuator, refer to the Positioner Mounting section.
6. Install a new converter, and secure to the housing with the two captive screws. Reconnect the input signal wires.
7. Refer to the Calibration section for the calibration procedure.

Parts Ordering

When corresponding with your Emerson Process Management sales office about this equipment, always mention the positioner type number. When ordering replacement parts, refer to the part number of each required part as found in the following parts list.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher instrument. Use of components not supplied by Emerson Process Management may void your warranty, might adversely affect the performance of the instrument, and could result in personal injury or property damage.

Parts Kits

Repair Kits

Description	Part Number
3660 w/0.2 to 1 bar (3 to 15 psig) input	R3660X00012
3660 w/0.4 to 2 bar (6 to 30 psig) input These kits contain keys 9, 26, 27, 28, 29, 43, 44, 45, 49, 95, and 97. Keys 43, 44, 45 and 49 are used for the 3660 with bypass only. An additional O-ring is included in kit R3660X00012, but is not used for the 3660.	R3660X00022
3661 This kit contains keys 9, 26, 27, 28, 29, 43, 44, 45, 49, 95, and 97. Keys 43, 44, 45, and 49 are included in kit R3660X00012, but they are not used for the 3661. An additional O-ring is also included in the kit for the I/P converter outlet.	R3660X00012

Mounting Kits

Description	Part Number
1250 and 1250R Sizes 30 and 34 Clamp mounting kit contains key numbers 64, 65, 66, 67, 68, 69, and 70	21B3931X0A2
Center-bolt mounting kit contains key numbers 68, 69, 70, 71, and 72	21B3932X0A2
1250 and 1250R Size 45 Clamp mounting kit contains key numbers 64, 65, 66, 67, 68, 69, 70, and 101 through 104	21B3931X0B2
Center-bolt mounting kit contains key numbers 68, 69, 70, 71, 72, and 101 through 104	21B3932X0B2
657 and 667 Sizes 30, 34, and 40 kit contains key numbers 69, 70, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, and 93	31B6741X0A2
Sizes 45 and 46 kit contains key numbers 70, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, and 93	31B6741X0B2
Sizes 50 and 60 kit contains key numbers 70, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, and 93	31B6741X0C2
3024C kit contains key numbers 68, 69, 70, 71, and 72	21B3932X0C2
3024S kit contains key numbers 64, 65, 66, 67, 68, 69, and 70	21B3931X0C2
GX kit contains key numbers 68, 69, 71, and 72	GE04613X0A2

Parts List

Note
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

Positioner Common Parts

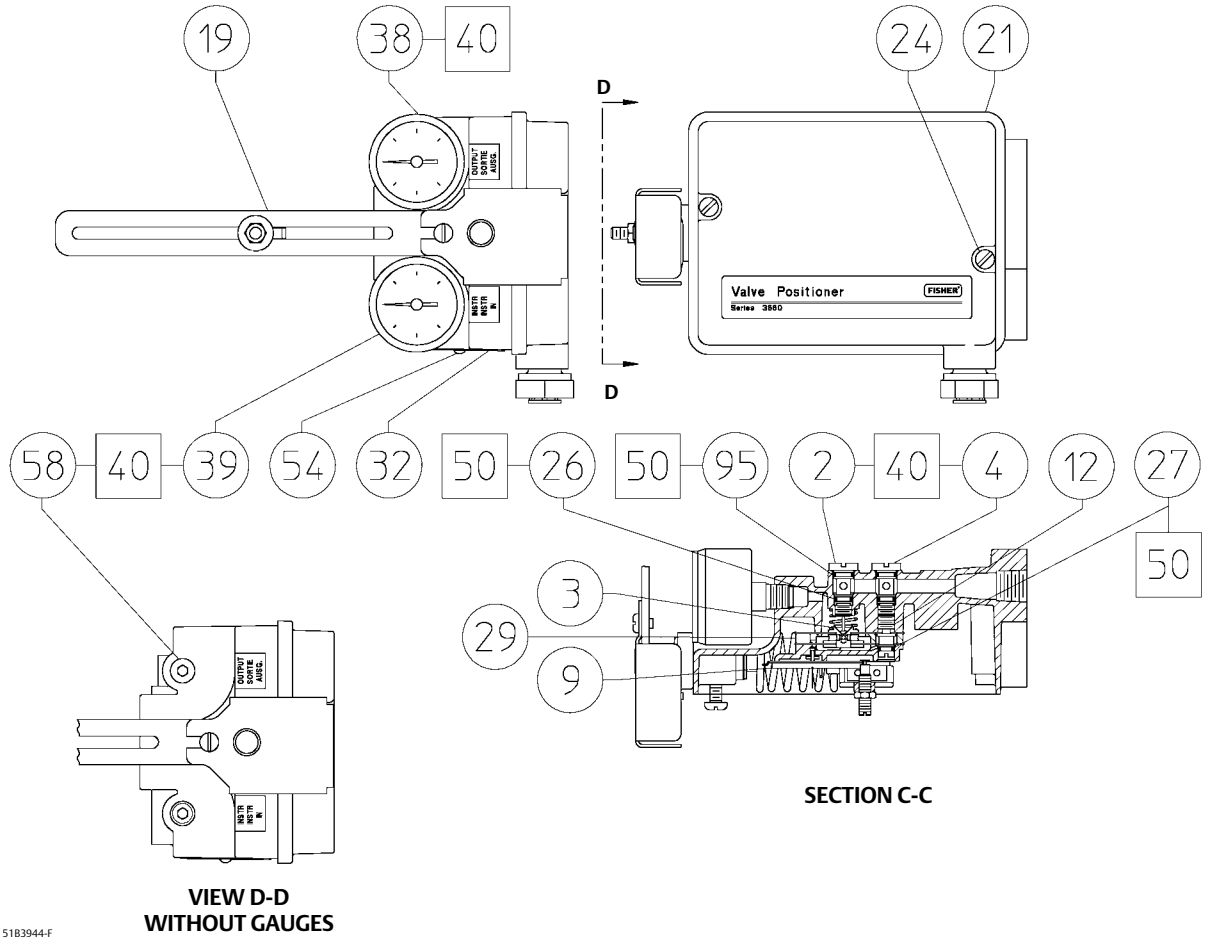
Key	Description	Part Number
1	Housing assembly, A03600 For 3660 For 3661	
2*	Valve assembly, A96061	11B3889X012
3	Spring, 316 stainless steel	
4*	Restrictor assembly, aluminum (includes filtration screen)	11B3887X012
5	Damping screw, stainless steel	
6	Calibration tool, aluminum	
7	Cheese head screw stainless steel (7 req'd for 3660; 13 req'd for 3661)	
8	Cover plate assembly, aluminum	
9*	Flapper, A95052	11B3903X012
10	Flapper spring, stainless steel	
11	Cheese head screw, stainless steel (4 req'd)	
12	Restrictor screw, stainless steel	
17	Lever assembly, aluminum	
18	Adjusting screw, stainless steel	
19	Feedback lever assembly, stainless steel Standard For Baumann actuators	

Note
Parts 19A through 19U are shown in figure 26.

19A	Pilot Shaft
19B	Locknut
19C	Washer

*Recommended spare parts

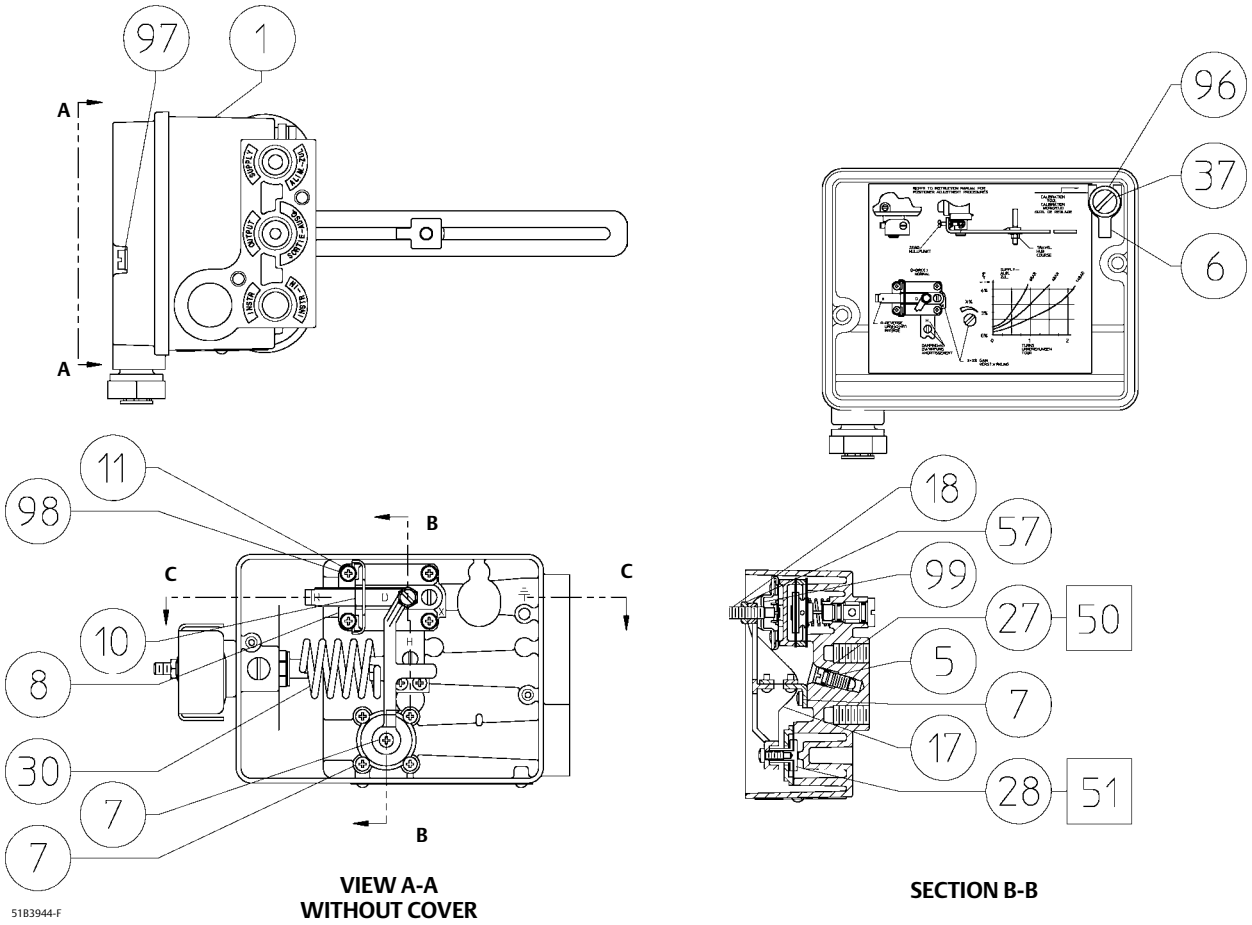
Figure 24. Fisher 3660 Positioner Assembly



Key	Description	Part Number
19D	Nut	
19E	Lever Sub-assembly	
	Standard	
	For Baumann actuators	
19F	Zero Shaft	
19G*	Slide Bearing (2 req'd)	11B3916X012
19H	Housing Bushing	
19J	Retaining Ring	
19K*	Disc	11B3918X012
19L*	O-ring	11B8369X012
19M*	O-ring	11B8368X012
19N	Spring	
19P	Retaining Screw	
19Q	Retaining Ring	
19R	Roll Pin	
19S	Zero Adjust Screw	
19T	Cover	
19U	Cover Screw	
21	Cover assembly, aluminum	
24	Machine screw, stainless steel (2 req'd)	
26*	O-ring, EPDM (2 req'd for 3660; 3 req'd for 3661)	11B3935X012
27	O-ring, EPDM (2 req'd)	
28*	Diaphragm assembly, aluminum	
	3660 and 3661	
	0.2 to 1.0 bar (3 to 15 psig)	11B3871X012
	3660 only, 0.4 to 2.0 bar (6 to 30 psig)	11B3875X012
29*	Output diaphragm assembly, aluminum	11B3897X012
30	Range spring, N09902 nickel alloy	
	Standard	11B3880X012
	Split range	11B3881X012
	For Baumann actuators	17B0662X012
32	Nameplate, A91100	
33	Ground terminal for 3661 (2 req'd)	
34	Cable gland for 3661, plastic	
35	I/P restrictor ass'y for 3661, aluminum	
36	Pipe plug for 3661, stainless steel	
37	Machine screw, stainless steel	

*Recommended spare parts

Figure 24. Fisher 3660 Positioner Assembly (continued)



Key	Description	Part Number
38*	Output gauge (optional)	
	Dual scale	
	0 to 2 Kg/cm^2/0 to 30 psig	11B4036X042
	0 to 11 Kg/cm^2/0 to 160 psig	11B4036X062
	Triple scale	
	0 to 2 bar/0 to 0.2 MPa/0 to 30 psig	11B4036X012
	0 to 11 bar/0 to 1.1 MPa/0 to 160 psig	11B4036X032
39*	Instrument gauge (optional for 3660 Only)	
	Dual Scale	
	0 to 2 Kg/cm^2/0 to 30 psig	11B4036X042
	0 to 4 Kg/cm^2/0 to 60 psig	11B4036X052
	Triple scale	
	0 to 2 bar/0 to 0.2 MPa/0 to 30 psig	11B4036X012
	0 to 4 bar/0 to 0.4 MPa/0 to 60 psig	11B4036X022
40	Anti-seize sealant (not furnished with positioner)	

Note
Keys 41 through 49 and key 79 apply to 3660 with bypass valve only. Refer to figure 23.

Key	Description	Part Number
41	Bypass body assembly, aluminum	
42	Bypass lever assembly, plastic	
43*	O-ring, EPDM	1J4888X0022
44*	O-ring, EPDM	11A8741X032
45*	O-ring, (2 req'd)	11B8420X012
46	Retaining ring, stainless steel	
47	Cheese head screw, (2 req'd)	
48	Lubricant, silicone sealant (not furnished with positioner)	
49*	O-ring, EPDM (3 req'd)	10A3716X032
50	Lubricant, silicone sealant (not furnished with positioner)	

*Recommended spare parts

Figure 25. Fisher 3661 Positioner Assembly

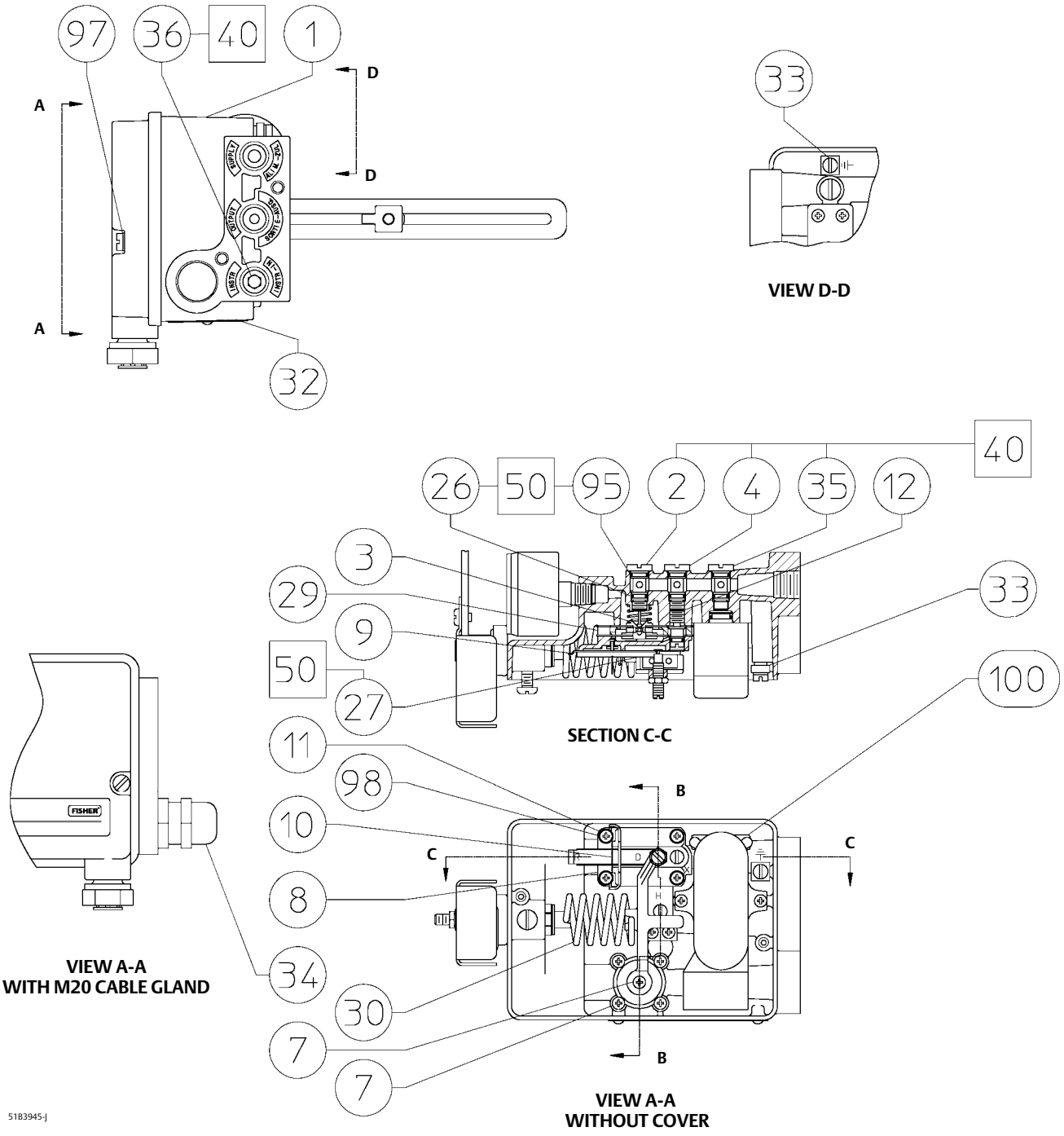
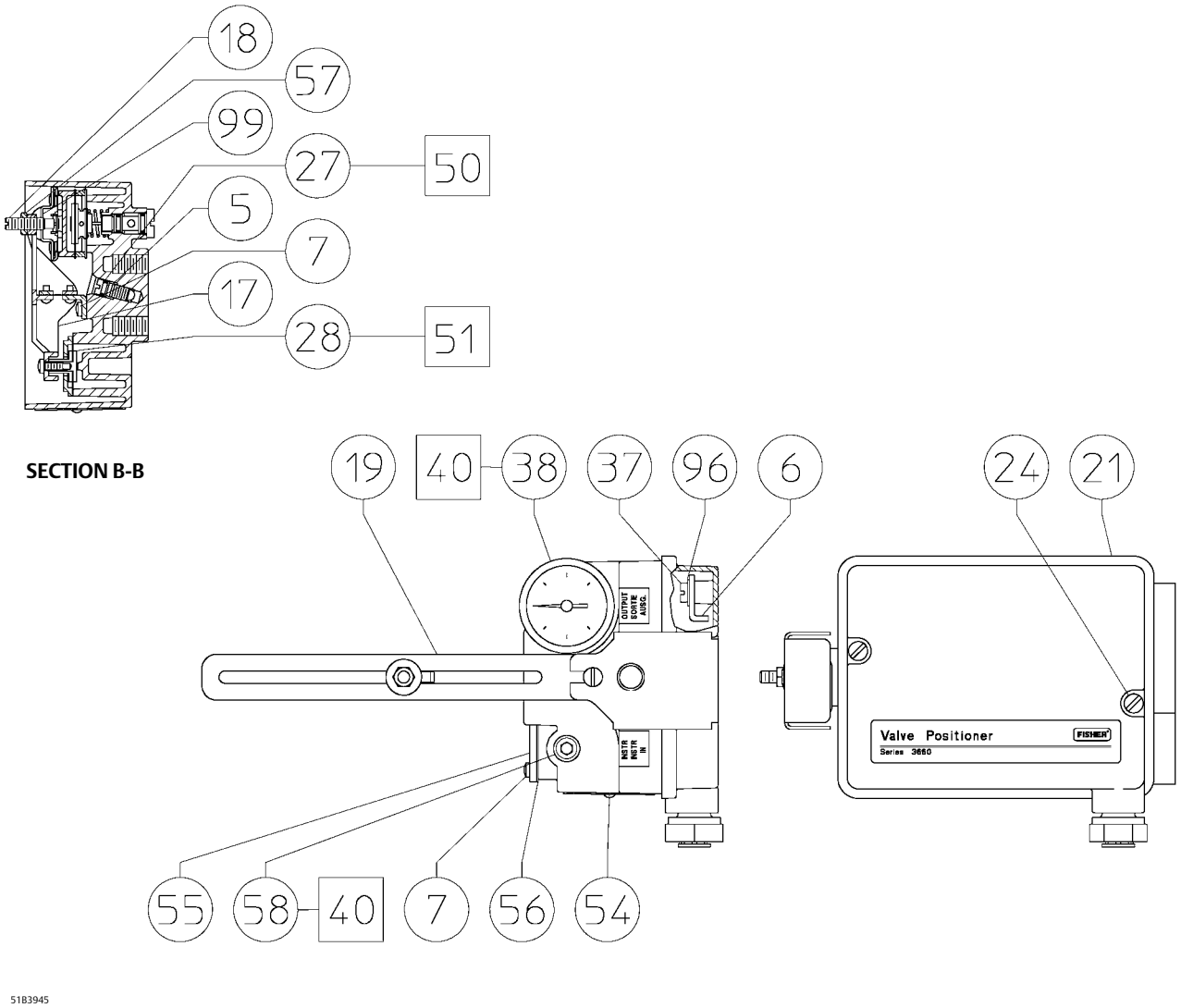


Figure 25. Fisher 3661 Positioner Assembly (continued)



Key	Description	Part Number
51	Adhesive, Loctite® 4210™ Prism® Instant Adhesive, (not furnished with positioner)	
54	Self-tapping screw, stainless steel (2 req'd)	
55	Cover plate for 3661, A95052	
56*	Cover plate gasket for 3661, silicone	11B3869X012
57	Hex nut, aluminum/chromate	
58	Pipe plug, stainless steel 1 req'd for 3661 w/o output gauge option 2 req'd for 3660 & 3661 w/o instrument and output gauge option	
79	Wire tie for 3660 with bypass valve only, plastic	
95*	O-ring, EPDM (2 req'd for 3660; 3 req'd for 3661)	11B8302X012
96	Plain washer, stainless steel	
97*	Cover screw gasket, silicone (2 req'd)	11B8414X012
98	Washer, stainless steel (4 req'd)	
99	Flapper spring stop, stainless steel	
100*	I/P converter module for 3661	33B7075X022

*Recommended spare parts

Diagnostic Connections

FlowScanner Valve Diagnostic System Hookup
Includes pipe tees, pipe nipples, pipe bushings, connector bodies, and body protectors.

Note
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

Key Description

For 3660 Positioner
For units with supply gauge
SST fittings
Brass fittings
For units without supply gauge
SST fittings
Brass fittings
For 3661 Positioner
For units with supply gauge
SST fittings
Brass fittings
For units without supply gauge
SST fittings
Brass fittings

Mounting Parts

Common Mounting Parts

Note
Keys 73 through 78 apply to regulator mounting parts (casing mounted only).

Key Description

73 Bracket, pl steel
For 657, 667, 1250, 1250R, 3024S and GX
74 Cap screw, 304 stainless steel (2 req'd)
For 1250, 1250R, and 3024S
75 Washer, pl steel (2 req'd)
1250, 1250R, and 3024S

76 Lockwasher, pl steel (2 req'd)
For 1250, 1250R, 3024S,
Lockwasher and Hex Nut (1 req'd)
For GX

Key Description

77 Cap screw, pl steel (2 req'd)
For 657, 667, 1250, 1250R, 3024S and GX

78 Hex nut, zinc pl steel (2 req'd)
For 657, 667, 1250, 1250R, 3024S and GX

Note
The following mounting parts are included in Mounting Kits listed on page 34.

1250 and 1250R Actuators

64 Bracket, clamp mounting only, A03600
65 Stud, clamp mounting only, stainless steel (2 req'd)
66 Hex nut, clamp mounting only, steel (4 req'd)
67 Washer, clamp mounting only, steel (2 req'd)

68 Feedback plate, stainless steel
69 Hex head screw, stainless steel (2 req'd)
70 Washer, stainless steel (2 req'd)

71 Washer, center bolt mounting only
72 Hex head screw, center bolt mounting only, stainless steel

101 Lockwasher, stainless steel (2 req'd)
For size 45, 20 to 30 mm travel only

102 Machine screw, stainless steel (2 req'd)
For size 45, 20 to 30 mm travel only

103 Feedback adaptor, stainless steel
For size 45, 20 to 30 mm travel only

104 Wedge nut, stainless steel (2 req'd)
For size 45, 20 to 30 mm travel only

3024S Actuator

64 Mounting Bracket
65 Stud, stainless steel (2 req'd)

66 Hex nut, steel (4 req'd)
67 Washer, steel (2 req'd)
68 Feedback plate, stainless steel
69 Hex head screw, stainless steel (2 req'd)
70 Washer, stainless steel (2 req'd)

Key Description

3024C Actuator

68 Feedback Plate
69 Socket head screw (2 req'd)
70 Washer, stainless steel (2 req'd)
71 Washer, sealing
72 Screw, Hex Head

657 and 667 Actuators

69 Hex head screw, stainless steel (2 req'd)
Sizes 30, 34 and 40
70 Washer, pl steel (2 req'd)
82 Mounting Bracket, stainless steel

83 Stud clamp, stainless steel

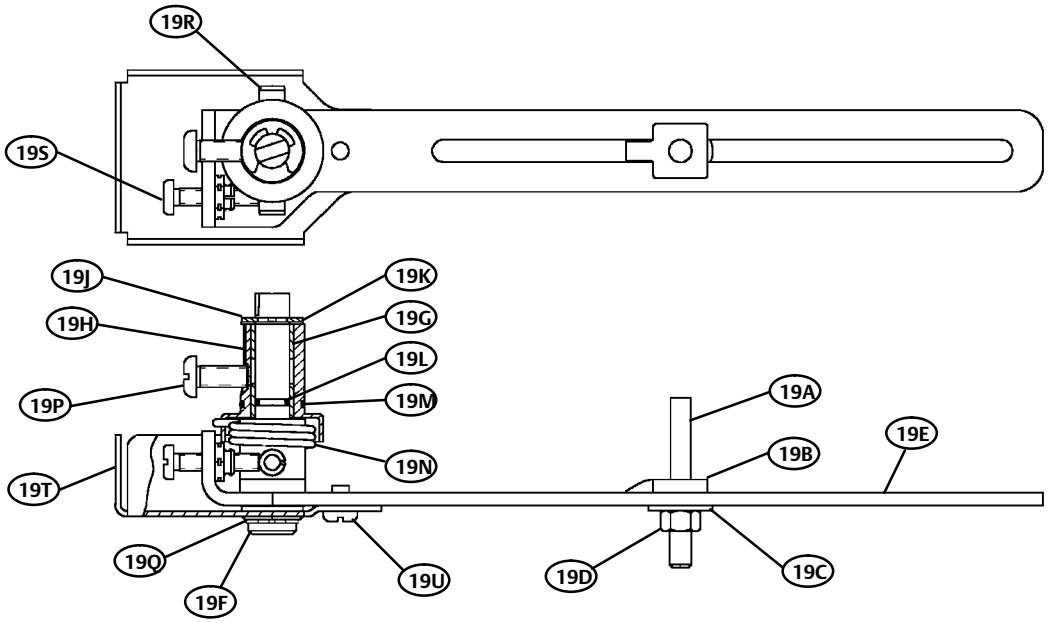
Key Description

84 U-bolt, stainless steel (2 req'd)
Sizes 50 and 60
Sizes 30, 34, 40, 45 and 46
85 Washer, stainless steel (4 req'd)
86 Hex nut, stainless steel (4 req'd)
87 Connector bracket, stainless steel
88 Feedback arm, stainless steel
89 Sealing washer
90 Hex nut, stainless steel
91 Machine screw, stainless steel (2 req'd)
92 Washer, stainless steel (2 req'd)
93 Hex nut, stainless steel (2 req'd)

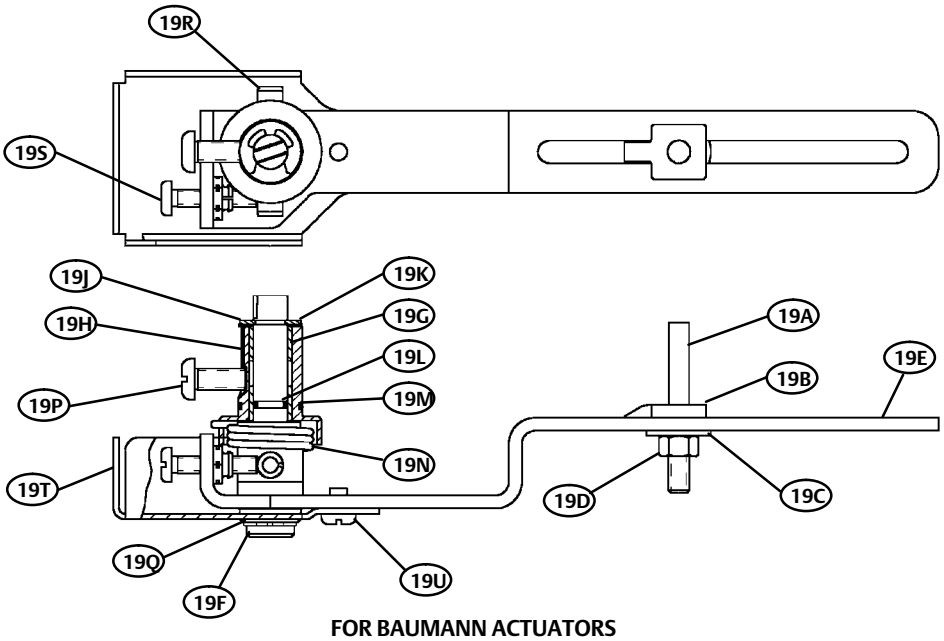
GX Control Valve and Actuator System

68 Feedback Plate
69 Socket head screw (2 req'd)
71 Washer, sealing
72 Screw, Hex Head

Figure 26. Feedback Lever Assembly



STANDARD

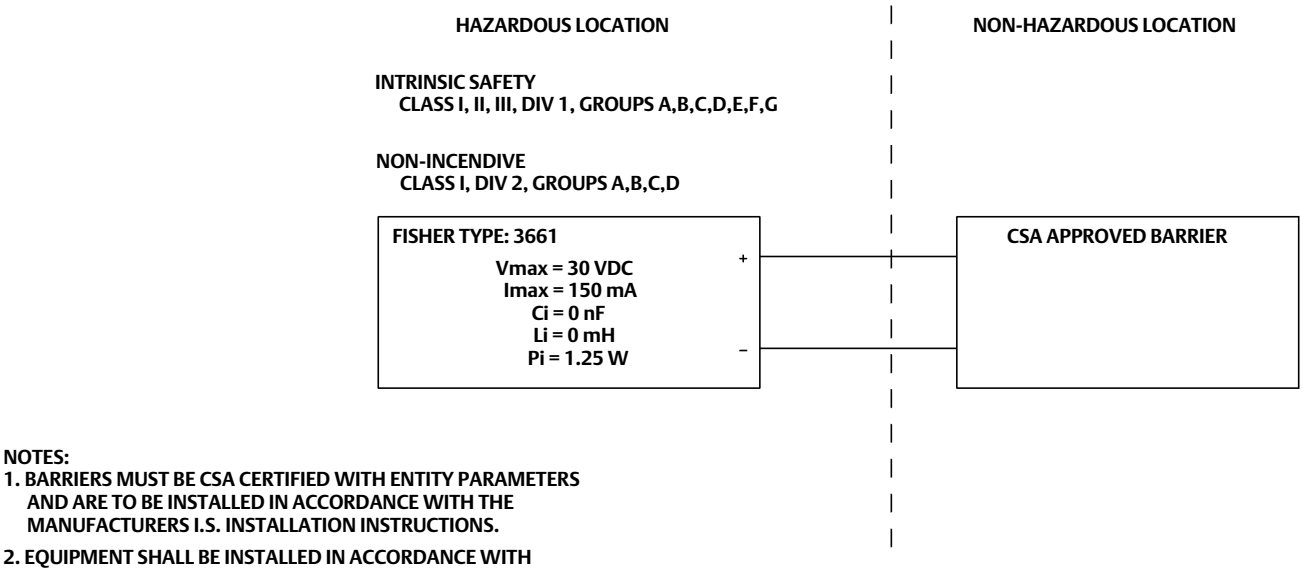


FOR BAUMANN ACTUATORS

Loop Schematics/Nameplates for 3661 Positioner

This section includes loop schematics required for wiring of intrinsically safe installations, as well as typical approvals nameplates. If you have any questions, contact your Emerson Process Management sales office.

Figure 27. CSA Loop Schematic for Fisher 3661 Positioner



NOTES:

1. **BARRIERS MUST BE CSA CERTIFIED WITH ENTITY PARAMETERS AND ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS I.S. INSTALLATION INSTRUCTIONS.**
2. **EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART I.**
3. **FOR ENTITY INSTALLATION (I.S. AND NI): Vmax > Voc, Imax > Isc, Ci + Ccable < Ca, Li + Lcable < La.**

GE28591-A

Figure 28. Typical CSA/FM Approval Nameplate for Fisher 3661 Positioner

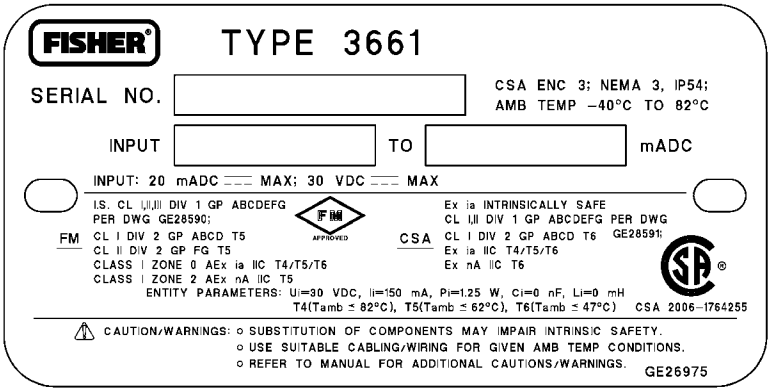
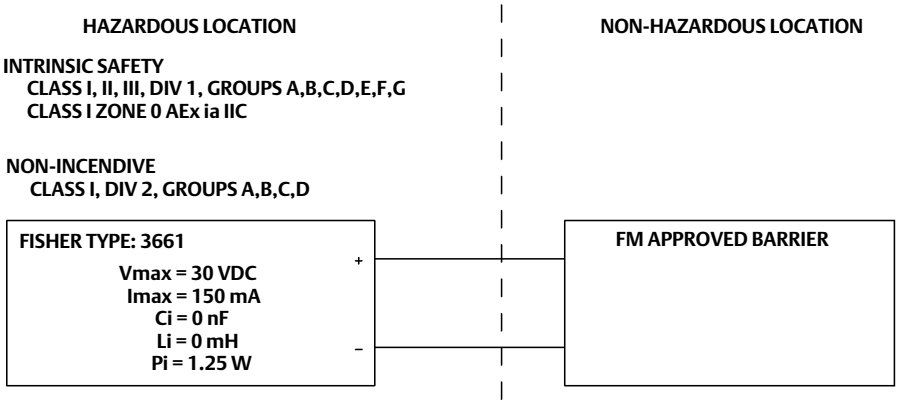

FISHER
TYPE 3661
SERIAL NO.
CSA ENC 3; NEMA 3, IP54;
AMB TEMP –40°C TO 82°C
INPUT
TO
mADC
INPUT: 20 mADC ⎓ MAX; 30 VDC ⎓ MAX
I.S. CL I,II,III DIV 1 GP ABCDEFG
PER DWG GE28590;
FM
CL I DIV 2 GP ABCD T5
CL II DIV 2 GP FG T5
CLASS I ZONE 0 AEx ia IIC T4/T5/T6
CLASS I ZONE 2 AEx nA IIC T5
APPROVED
CSA
Ex ia INTRINSICALLY SAFE
CL I,II DIV 1 GP ABCDEFG PER DWG
GE28591;
CL I DIV 2 GP ABCD T6
Ex ia IIC T4/T5/T6
Ex nA IIC T6
ENTITY PARAMETERS: Ui=30 VDC, Ii=150 mA, Pi=1.25 W, Ci=0 nF, Li=0 mH
T4(Tamb ≤ 82°C), T5(Tamb ≤ 62°C), T6(Tamb ≤ 47°C) CSA 2006–1764255
CAUTION/WARNINGS: o SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
o USE SUITABLE CABLING/WIRING FOR GIVEN AMB TEMP CONDITIONS.
o REFER TO MANUAL FOR ADDITIONAL CAUTIONS/WARNINGS.
GE26975

Figure 29. FM Loop Schematic for Fisher 3661 Positioner



⚠ WARNING

FOR INTRINSICALLY SAFE APPLICATIONS: THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO CONSTITUTE A POTENTIAL RISK OF IGNTION BY IMPACT AND FRICTION. AVOID IMPACT AND FRICTION DURING INSTALLATION AND USE TO PREVENT RISK OF IGNTION.

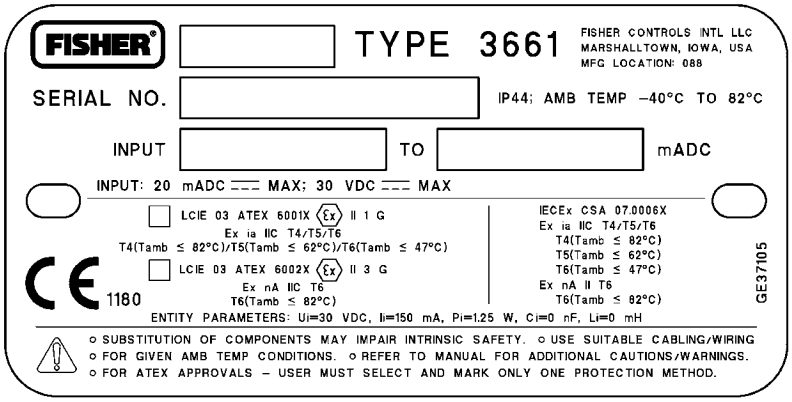
NOTES:

1. **THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), NFPA 70, ARTICLE 504 AND ANSI/ISA RP12.6 OR ARTICLE 505.**
2. **CLASS 1, DIV 2 APPLICATIONS MUST BE INSTALLED AS SPECIFIED IN NEC ARTICLE 501-4(B). EQUIPMENT AND FIELD WIRING IS NON-INCENDIVE WHEN CONNECTED TO APPROVED BARRIERS WITH ENTITY PARAMETERS.**
3. **LOOPS MUST BE CONNECTED ACCORDING TO THE BARRIER MANUFACTURE'S INSTRUCTIONS.**
4. **MAXIMUM SAFE AREA VOLTAGE SHOULD NOT EXCEED 250 Vrms.**
5. **RESISTANCE BETWEEN BARRIER GROUND AND EARTH GROUND MUST BE LESS THAN ONE OHM.**
6. **NORMAL OPERATING CONDITIONS 30 VDC 20 mADC.**
3. **FOR ENTITY INSTALLATION (I.S. AND NI):**

Vmax > Voc or Vt Ci + Ccable < Ca,
Imax > Isc or It Li + Lcable < La.
Pi > Po, or Pt

GE28590-B

Figure 30. Typical ATEX/IECEx Approval Nameplate for Fisher 3661 Positioner


FISHER
TYPE 3661
FISHER CONTROLS INTL LLC
MARSHALLTOWN, IOWA, USA
MFG LOCATION: 088
SERIAL NO.
IP44; AMB TEMP –40°C TO 82°C
INPUT
TO
mADC
INPUT: 20 mADC MAX; 30 VDC MAX
LCIE 03 ATEX 6001X II 1 G
Ex ia IIC T4/T5/T6
T4(Tamb ≤ 82°C)/T5(Tamb ≤ 62°C)/T6(Tamb ≤ 47°C)
LCIE 03 ATEX 6002X II 3 G
Ex nA IIC T6
T6(Tamb ≤ 82°C)
IECEx CSA 07.0006X
Ex ia IIC T4/T5/T6
T4(Tamb ≤ 82°C)
T5(Tamb ≤ 62°C)
T6(Tamb ≤ 47°C)
Ex nA II T6
T6(Tamb ≤ 82°C)
1180
GE37105
ENTITY PARAMETERS: Ui=30 VDC, Ii=150 mA, Pi=1.25 W, Ci=0 nF, Li=0 mH
o SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY. o USE SUITABLE CABLING/WIRING
o FOR GIVEN AMB TEMP CONDITIONS. o REFER TO MANUAL FOR ADDITIONAL CAUTIONS/WARNINGS.
o FOR ATEX APPROVALS – USER MUST SELECT AND MARK ONLY ONE PROTECTION METHOD.

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